

POPULAR MECHANICS®

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**moving machine
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Pontiac Catalina

There's a good deal more to driving than a straight-line quarter-mile, and nobody knows that better than the performance-minded. Which is why Pontiac's Catalina shows up so often among you people.

One of the reasons for this popularity is the choice of engine/transmission teams. Standard equipment is a 215-hp Trophy V-8 hooked up to a three-speed stick, of course. But you can get a storming 405-horse engine and heavy-duty four-speed as extra-cost options. And other extra-cost options blanket the area in between, including automatics.

Wide-Track and Pontiac's own special han-

dling precision come standard with the Catalina, naturally. So does a fat helping of pure luxury.

The great thing is that a new Catalina goes easy on your bankroll—this is Pontiac's lowest-priced full-sized series. Talk it over with your Pontiac dealer first chance you get. Plan to spend some time with him—you could use up a whole day just looking through that list of options, and a happier time you couldn't imagine.

(Oh, and if you'd like to check your Cat against the clocks, feel free. No fair making the Catalina do the pushing while the dragster has all the fun.) Pontiac Motor Division, General Motors Corporation.

If you wish additional sources of information for the articles in this issue, or if you wish the name and address of the manufacturer of a particular product shown here, write to Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11, Ill. Ask for the free "Where-to-Find-It-List" for this issue.

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Next Month . . .

A master sergeant tells you how the guerilla war in Vietnam looks—through the sights of an M-1 rifle . . . Owners give you their opinions of the new Buick V6 and Ford Fairlane, after driving them over a million miles . . . A racing expert speculates on whether or not the Indianapolis race is in a rut . . . and maintenance-weary homeowners learn how to keep paint from peeling.

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Fishing
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page 118



Chopper **Airliners**
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Make an Old
Mower Sweep
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New tire brings you back "free"!

One inescapable thing in trucking is that a "run" means a "round trip."

You have to figure *most any* truck tire will get you there and back. But Goodyear's new Super Cross-Rib truck tires get you back "free"!

How come? Simple. Super Cross-Rib *doubles your drivewheel mileage* over ordinary tires.

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in ordinary tires. The outer tread is super-toughened to run farther. The inner tread is more resilient to restrict flexing and reduce heat buildup—a major cause of tire failure.

So when you think of any "run," think of Super Cross-Rib. The cost of getting there is the same. Super Cross-Rib gets you back "free." See your Goodyear Dealer or Goodyear Service Store today. Goodyear, Akron 16, Ohio

ANOTHER REASON WHY: MORE TONS ARE HAULED ON GOODYEAR

GOODYEAR

This One



NY5D-1YN-BT2A

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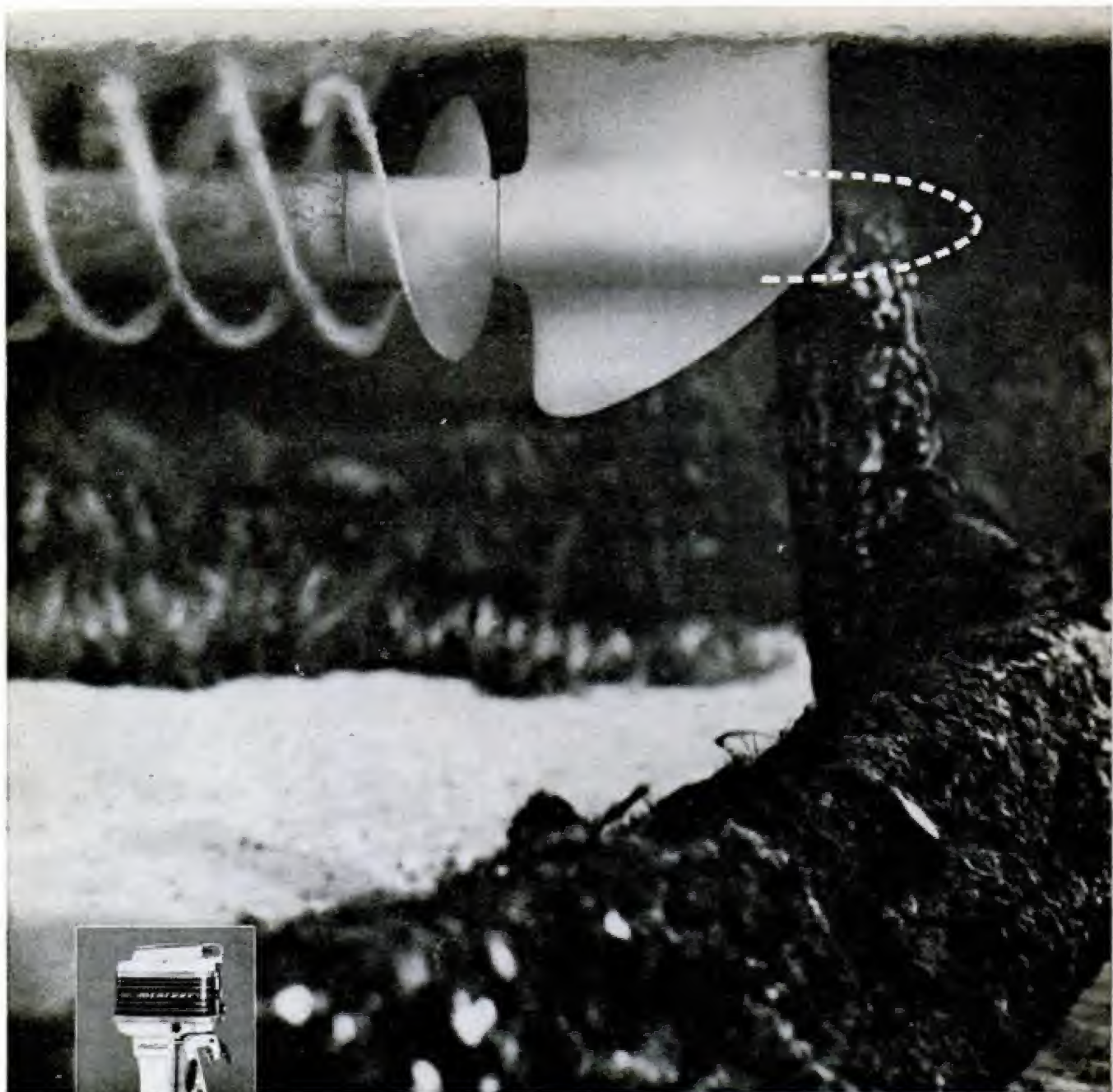
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Make an Old
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Camera
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page 190



Photographed underwater at Florida's Silver Springs



No Snag, No Drag

Ever take a fish's-eye view of a Mercury? It may give you a new slant on the differences between outboards.

All Mercury outboard motors have a streamlined one-piece lower unit that glides over unseen obstacles. There's no protruding nose to snag on weeds, logs, or trotlines.

And, speaking of lower units, did you know that a driving propeller creates a vacuum behind its hub? It does. And, this vacuum cuts down mph and mpg.

Not so with Merc. Merc's exhaust fires out the center of the prop, destroying the drag, burying the noise and fumes. (We call it "Jet-Prop.")

No snag, no drag with Mercury. Just more RUN for your money!

MERCURY

**100, 85, 70, 50, 45, 25, 9.8, and
6 horsepower outboards**

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Over the editor's desk

Metallic Brake Linings

After reading your January article on Velvetouch Metalik brake linings, I decided to put a set on my '60 Falcon. When I went into a local auto-parts store, the owner said he couldn't get the linings and wouldn't recommend them if he could. He said metallic linings would cause undue wear on my brake drums.

Salinas, Calif.

LYNN HETTRICK

A few years ago, your store owner might have been right. But the amount of drum wear caused by Velvetouch Metalik linings is an insignificant .0002 to .0003-inch per thousand miles of vehicle travel. That's equal to or less than the wear caused by quality conventional asbestos linings. As for obtaining the Velvetouch linings, R. C. Bringleb of the S. K. Wellman Co., 200 Egbert Rd., Bedford, Ohio, can tell you where to find them in your area.

Buy Direct From Detroit?

I would like to buy a General Motors automobile from the Detroit factory. This would save me a great deal of money by excluding the dealer's profit.

San Francisco, Calif.

V. L. BUXBAUM

You can take delivery at the factory and save freight but your local dealer still "makes the sale" and gets the profit—there's no way of bypassing him. That profit, incidentally, is what keeps him in business so that when you need a fender, voltage regulator or transmission adjustment in Elk's Knee, Montana, somebody's around with \$500,000 worth of parts and shop equipment and four or five mechanics to serve you.

Won't Roll in the Chop

This Swish, from your March-May 1958 plans, was fun to build with ordinary carpenter's tools and it is more than fun boating with it. With a 40 hp. Mercury and my wife and myself in the boat, we have had



it up to 30 m.p.h. by our boat speedometer, and up to 25 m.p.h. pulling a teen-age skier.

We have come across the often-choppy Chain of Lakes with a strong cross wind and the boat was stable, easy to keep on course and had no tendency to roll.

Brookfield, Ill.

ERNEST V. THOMPSON

Posterity's Dim View

With the cost of iron and steel what it is, I see nothing bright about catapulting junked autos to the bottom of the sea from the deck of a carrier (page 154, Feb. PM). Why aren't the junked cars salvaged for their steel instead? We are a wasteful nation.

Philadelphia, Pa.

ANDY VENA

... Posterity will think little of these generations when it looks back at the record and down into those empty iron mines. Grand Rapids, Mich.

J. R. HARMAN

We're inclined to agree that some promotion man's bright idea for dramatizing the need to get junk autos off the highways was rustier than he realized.

Whoosh!

Under your February picture of the Seattle World's Fair 600-foot Space Needle, you stated it would be served by two 800-feet-per-second elevators. The ride of 600 feet in less than a second would not be too bad but it is going to be hard on people when the elevator stops.

Jackson, Tenn.

JOHN SAWYER

Not as hard as we were on the proof-reader who seconded his minutes.

Quick-Wit Disagreement

I disagree with the answer to situation 9 of your Test Your Quick-Wit Quotient (Jan. '62 PM). Why not open the hood and pull the center wire from the distributor? This will stop the engine. . . .

Villanova, Pa.

JOHN ZUCKER

The idea of pulling out the wire (which many other readers also suggested) would be good were it not for the danger of the child inside the car pulling the automatic-shift lever into Drive while you were in front struggling with the hood latch. People have been pinned and injured by the creep action of an automatic transmission car which is set on a high idle.

Football Offensive

Mr. Foss (Editor's Desk, Feb. PM) states soccer is harder to play and requires more courage and skill than football. I doubt he

(Continued to page 10)

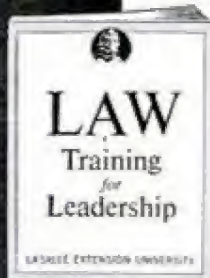
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210

has ever put a block on a big defensive lineman or tackled a charging fullback. I have and I have also played soccer and I can say football requires more courage, skill and stamina than any other sport.
 Brooklyn, N.Y. **NOEL INZERVILLE**

Football is not only a game of brute strength but of brains. A player must try to outwit his opponent and it takes great skill for a football team to work as a unit with perfect timing . . .

Freeport, Ill. **FRED CREMER**

Perhaps you football fans would like to engage Mr. Foss in another challenging sport—boxing.

Careful Scot

Our favorite Scotsman is George Blow, the boating specialist in PM's Art Department. Born in Dundee, Scotland, George got his introduction to boating on the River Tay.

We've often wondered how George managed to achieve such a fine record for accuracy in his boat construction drawings. They are more accurate and comprehensive, in fact, than some we've seen produced by naval architects. The other day we learned the answer—when we came



upon George putting the finishing touches on a scale model of the PM Jet boat (page 176). Seems that George builds them before he draws them, to make sure the construction details are correct and clearly shown.

That's not a bad idea, particularly for any project as complex as a boat. Do any of you boat builders "miniaturize" your projects first?

The Editors

LOOKING FOR LONG WEAR IN SERVICE SHOES?

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Better Things for Better Living . . . through Chemistry

Ask for Neoprene soles the next time you buy service shoes.

HOW TO MAKE YOUR BOSS SIT UP AND TAKE NOTICE

Best way we know of is to come up with the right answers on the job. Show him you have the drive and ambition it takes to get ahead.

How? By getting the right kind of training... training that enables you to come up with the right answers. Nowadays the crying need in business and industry is for men with special knowledge—skilled technicians, plant and office workers who have more to offer than on-the-job experience.

Without the right training you're just another one of the millions competing for the same, dull routine jobs, the same low salary.

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- ☐ Mechanical Drafting
- ☐ Sheet Metal Drafting

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- ☐ Electrical Engineering

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- ☐ Short Story Writing

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- ☐ Industrial Supervision
- ☐ Personnel-Labor Relations
- ☐ Supervision

MECHANICAL and SHOP

- ☐ Diesel Engines
- ☐ Gas-Elec. Welding
- ☐ Heating and Air Conditioning
- ☐ Industrial Engineering
- ☐ Industrial Instrumentation

- ☐ Industrial Safety
- ☐ Machine Shop Practice
- ☐ Mechanical Engineering
- ☐ Plumbing and Heating
- ☐ Professional Engineer
- ☐ Quality Control
- ☐ Reading Shop Blueprints
- ☐ Refrigeration and Air Conditioning
- ☐ Tool Design
- ☐ Tool Making

RADIO, TELEVISION

- ☐ General Electronics Tech.
- ☐ Industrial Electronics
- ☐ Practical Radio-TV Eng'r'g
- ☐ Radio-TV Servicing
- ☐ TV Technician

RAILROAD

- ☐ General Railroad

STEAM and DIESEL POWER

- ☐ Combustion Engineering
- ☐ Power Plant Engineer
- ☐ Stationary Diesel Engr.
- ☐ Stationary Steam Engines

TEXTILE

- ☐ General

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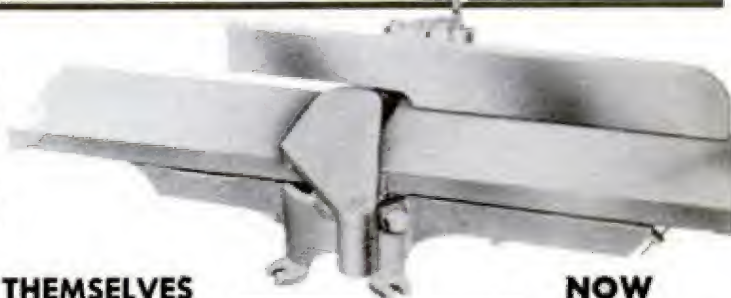
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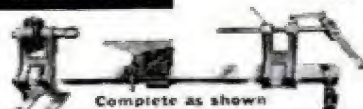
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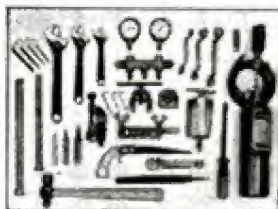
25 Kits
20 Shop Projects

Learn by Practicing—Get Experience

The new CTI semi-sealed condensing unit. You build this heavy-duty commercial-type unit from 25 kits that CTI sends without extra cost. You complete 20 Shop Projects. After assembling unit, you may then build an air conditioner, freezer, refrigerator or milk cooler.

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You get wrenches, tube flaring tools, hammer, tubing, fittings, gauges and other items used by the experienced mechanic. Everything is of professional quality. Best of all, CTI trains you to use tools with speed and skill.



"A demand for many thousands of additional mechanics who can install, maintain, and repair air-conditioning and refrigeration equipment is expected in the 1960s," the U.S. Dept. of Labor reports. "The use of air-conditioning in offices, stores, and theatres is increasing tremendously. In homes, the number of centrally installed air conditioning units doubled between 1957 and 1960." The growth of refrigeration in food preservation and in the manufacture of synthetic rubber, oil, high-test gasoline, medicine and drugs is also stressed by the Labor Dept. Want to be a mechanic in this great-growth field? Find out how—by mailing coupon below for complete information! No obligation.

Easy and Interesting Course

CTI's exclusive home study course is expertly written, clearly illustrated, easy to understand. It offers up-to-date knowledge and includes kits of tools and parts that you assemble into a working unit. It provides job experience projects which help you put knowledge to practical use. It's prepared especially for men who've had no previous experience. You'll enjoy CTI lessons.

Go in Business—Be the Boss

Opportunities to go in business are available because air conditioning is one of America's two fastest-growing industries. Start in a small way working from your home, and gradually expand. In time, you may want to add a sales division. Manufacturers offer attractive franchises and aids to ambitious and qualified men. Many CTI graduates report they are starting repair shops.



Make Money as You Train

Many CTI students earn money in spare time. Some handle servicing for food stores, restaurants, taverns, etc., on a monthly fee basis. Others work part time with local dealers. Many make service calls to homes on their own.



Graduates Praise Training

"I started my own business. Earn from \$800 to \$900 a month."—Dale Landsberger, Okla. "Have gone into trucking refrigeration. My wages have tripled."—James Wiest, Minn. "I quit my \$75 a week job and am now making \$120 a week in a refrigeration shop."—Roy Goldsworth, Wyo. "Am a repair man and earn \$200 a month over what I used to."—Albert Baum, Ill.

Over 50,000 Graduates

CTI is one of the nation's largest home study institutes and has graduated over 50,000 men. CTI is the only school in this field that sends parts-kits to build real equipment.



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Tune in on the inventors

Not all inventions are for the good of humanity. A spoil sport named Rollin Armer, of Berkeley, Calif., won patent No. 3,015,208 recently for a device that returns a parking meter to zero when the paying car moves from the parking space. The departing vehicle trips an air tube, canceling any time left on the meter and forcing the next parker to start from scratch.

A new concept for language study won patent No. 3,014,286 for Richard Hricak of Mamaroneck, N. Y. It covers a series of oral guides designed to position the student's lips, teeth and tongue for proper pronunciation. The hollow guides help the student learn to form the sounds of an unfamiliar language, but do not interfere with the user's voice.

Three Indianans, John Dyer, Brooks Short and Walter Parker, won patent No. 3,015,835 for an improved method of controlling the wiper motor and washer pump

on automobiles. The electrical device will keep the wiper from operating in conjunction with the washer if the washer reservoir is empty or the tubes are blocked.

Color in Polaroid photography may not be too far away. Patent No. 3,015,561 was awarded to Howard Rogers, of Weston, Mass., for a system for controlling the speed of coloring chemicals in a Land camera. His invention is an improvement on a process already patented by Edwin Land, and his rights have been assigned to Polaroid Corp.

A new kind of spark plug is currently pending a patent for Joseph Palecek, of Zenia, Ohio. He reports that his invention will provide a maximum of insulation at a minimum cost by replacing the ceramic plug body with a body formed of a structural plastic. By covering the entire external plug body, even the lugged base, his plastic insulation gives a maximum distance from the wire to the base, and is expected to be more durable and less fragile than existing porcelain bodies.

Copies of the original patents may be ordered for 25 cents each from the Commissioner of Patents, Dept. of Commerce, Washington 25, D. C.

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As a reader of this magazine, you are well aware of the expanding uses of Electronics in industry, business, broadcasting, the home. Electronics is changing our world, and a school offering training must keep pace with change. That's why the NRI staff of technical writers, teachers, editors and engineers is on the job constantly to keep NRI lessons and training equipment correct and up-to-date.

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DOUBLE-THINK is needed when refueling twin-engined Sahara as each engine has its own under-seat tank



Spotlight on the Citroën Sahara

By Heinz Schlichting, PM's International Editor

CITROËN, one of France's *Big Three* automakers, has an interesting "Sahara" version of its beloved ugly duckling, the 2-CV ("deux chevaux"). It may be the cheapest yet most versatile utility car ever built.

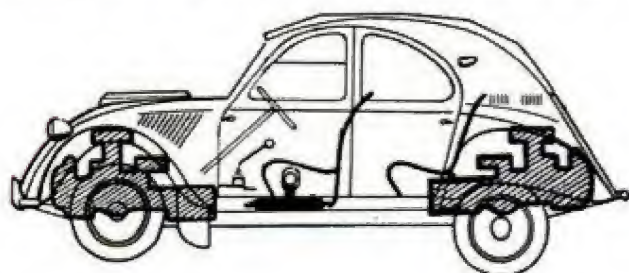
The Sahara was created by simply adding a second, identical, two-cylinder engine in the rear, and oversize tires to the familiar front-engined, front-drive, four passenger 2-CV, which is the Model-T of France.

The Sahara appears to be a normal 2-CV but for the air inlet port to the rear engine's cooling fan. The second 13-horsepower engine is placed in the luggage compartment.

Acceleration is boosted considerably with the second engine added, PM found in testing it. The Sahara will hit 25 miles per hour in 10 seconds; 37 in 15 seconds. Top speed is 65 m.p.h. (The standard 2-CV will just about make 50 m.p.h.)

Run by its front engine alone, the Sahara waddles along like a lame duck on its extra-wide Michelin-X tires inflated to only 10 pounds. These low-pressure tires create

SAHARA WAS CREATED from a standard 2-CV by adding identical, flat, two-cylinder engine in rear



considerable rolling friction but give better traction.

The car virtually glides over goat paths and maintains traction in deep, loose sand—through which it will climb a 40 percent grade. On hard ground, the 1800-lb. vehicle will climb grades up to 50 percent in its first-speed, "creeper" gear.

Thus, with 4-wheel drive, fully independent suspension and low-pressure tires, it runs all day over "impassable" terrain. Like a camel, delicately balancing its weight, it slowly, deliberately picks its way over sand, snow and marshes. In snow it competes with a good skier going up a not-too-steep grade.

In normal on-the-road use, the Sahara, with its 149-inch over-all length and 94-inch wheelbase, lends itself to maneuverable, economical operation in city traffic, yet is capable of long runs at top speed.

One engine squeezes out as much as 39 miles per gallon. With two engines, you can expect about 26 m.p.g. And on a flat-out, off-the-road tour (with both engines), PM got nearly 20 miles to the gallon. Even climbing around tricky passes in the French Alps, a Sahara went 19.5 miles on a gallon, and a 100-mile turnpike run showed 32.5 m.p.g. at 60 miles per hour.

Dual pushbuttons start the Sahara, but it's worth the effort to see the startled expressions on bystanders when they hear the second engine start up.

The power plants are opposed, two-cylinder, air-cooled, four-cycle engines of 26-cubic-inch displacement, each developing

(Continued to page 20)

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SECOND ENGINE drives the car's rear wheels and "breathes" cooling air through port in the trunk door

13 hp. at 4500 r.p.m. These overhead-valve engines have a 2.6-inch bore, a 2.44-inch stroke, and a compression ratio of 7.0:1. Crankshaft-driven fans provide cooling.

Each engine drives the wheels at its end of the car. There's no interconnecting shaft. Engines are linked only by the throttle and a common gear lever connecting the four-speed transmissions. The two clutches are hydraulically operated by a single pedal and master cylinder. A separate lever on the drive-shaft tunnel permits the three-way option of propelling the car with either engine, or both in tandem.

Primitively-styled and uncomfortable looking, the Sahara's sparse elastic and naked-pipe-frame seats dismay people at first glance. But scorn changes to admiration after one discovers the car's comfort.

The Sahara's excellent suspension system gives the little car extremely good roadability at speed on paved roads.

The car's comfort and utility make it a great vehicle for hunters, trappers and those who like to fish in out of the way places.

A favorite with geologists and other explorers, the Sahara is used by U.N. forces and in foreign oil fields. Besides "go-anywhere" traction and good road holding, there's a "spare" engine. And, if one engine won't start, you push or pull it with the other one until it fires up.

PM was lucky to drive the Sahara—in Europe—as it's currently sold only to commercial users. Even Frenchmen stand in line (with \$2200) for this unique car. If public interest grows, production could be upped. The second engine's installation isn't complicated, and in time, we might well find this dauntless compact scurrying up the Rockies. ★ ★ ★

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10 GOOD REASONS
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- 9** IT IS LOCATED CLOSE TO AN AREA WHERE GROWTH IS ASSURED!
The project is a U.S. Government commitment, with funds allocated over coming years. This is a fact — not wishful thinking. Very rarely, if ever, does any area offer this kind of solid, growth-producing foundation.
- 8** IT IS EXCELLENTLY LOCATED TO PROFIT FROM
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With direct access to two important U.S. Highways — East/West U.S. 192 connecting booming Melbourne with thriving Orlando and North/South highway U.S. 441, which leads to Miami and West Palm Beach. It is 35 miles west of Melbourne, 30 air miles from Cocoa — 45 from Cape Canaveral, 37 from Orlando, and only 10 miles from Florida's beautiful lake country.
- 7** THE LAW OF SUPPLY AND DEMAND WORKS FOR YOU — AS THE
DEMAND FOR LAND KEEPS GROWING...GROWING...GROWING!
Huge project NOVA has attracted over 100 giant industrial firms and smaller sub-contractors! This means thousands of employees and new residents (an estimated 40,000 in the next 2 years!) — and houses, stores, recreation facilities to serve them. This takes land — thousands of acres of it — from an already limited supply. The likely result: higher prices for the land that is still undeveloped!

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Member: Chambers of Commerce, Miami, Melbourne.

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2. LOW-PRICED REFRACTOR TELESCOPE is a precision-made optical instrument. Color-corrected, two-element objective lens gives full 67-power viewing with sharp, clear definition. This can be increased to 100X and 200X by using a Barlow lens which is included. Priced at \$19.95 ppd., the telescope is available from Edmund Scientific Co., Barrington, N. J.



3. ACCESSORY IMPULSE STARTER permits converting most gasoline-powered lawn and garden units of 4½ hp. or less from recoil to impulse starting. A few turns load spring, then the handle is folded over to start engine. Priced at about \$10.00, it's made by Beaver Products, Inc., Beaver Dam, Wis.



4. LIGHTWEIGHT PRECAST stone material permanently bonded to ½-in. insulation board is available in 14 x 32-in. panels which can be mounted with nails. After mounting, the joints are filled with regular ready-mix mortar. Panels are available in either gray blend or buff. Manufactured by AlSCO Aluminum Building Products, 225 S. Forge St., Akron 8, Ohio

5. PLASTIC-FINISHED random-grooved wall panels are produced in five distinctive wood grains and a wide variety of colors. Finish is laminated to ¼-in. hardboard and never needs waxing. Panels have tongue-and-groove edges and are easily installed with special clips and nails. Made by Woodall Industries, Inc., 3500 Oakton St., Skokie, Illinois



How to Select a Watch

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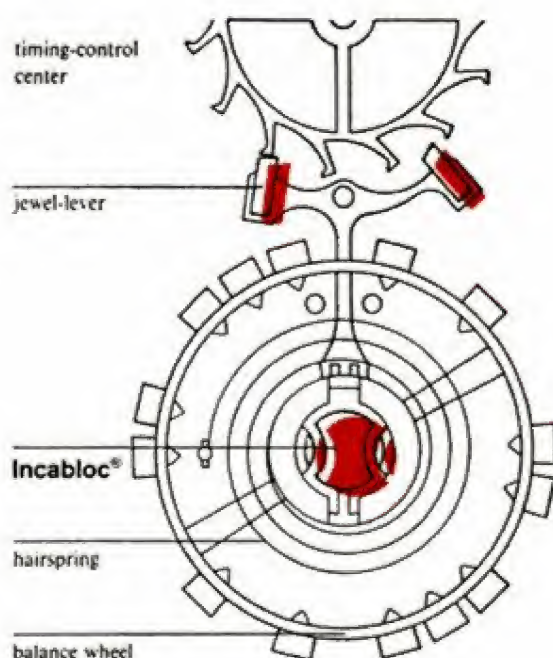
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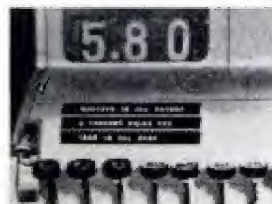
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Sportsmen are a funny bunch. They are so accustomed to working out double-duty gimmicks in their equipment that they confound even the manufacturer sometimes. Here's a batch of examples from conversation around the recent Sporting Goods Association show:

Plastic worms have become such a big item in tackle shops that one manufacturer, Sportsman's Products of Marion, Ind., made up a batch of giant display worms, 18 inches long and fitted with big 9/0 hooks to match. Always ready to try anything, salt-water fishermen tried them on big-fish trolling tackle. They were such a success (Dan Tessar, operating the charter boat *Uncle Duff* out of Panama City, took barracuda of 40 and 57 pounds) that the company is putting the king-sized "joke" worms into regular production.

West coast fly fishermen have long led the tackle industry in development of tackle for extremely long casts in fast, deep water. Any new product or technique that

looks like it might cast a little farther or sink a little faster is quickly adapted to their salmon and steelhead rivers. Myron Gregory, caster, fisherman and fly tier from Oakland, Calif., reports they're enjoying good results in deep-water fly casting with Gladding's Special Mark Five trolling line instead of ordinary fly line. The new line, which is a plastic-finished nylon braid over a lead wire core, is intended for deep trolling. But its finish is just like that of a good fly line, so it casts like a heavy level line, but sinks like a stone. Gregory reports he can fish flies in 80 feet of water, using a 30-foot shooting head of the lead line backed with monofilament shooting line.

Hunters around the world have used the new .44 Magnum handgun cartridge on almost every big game animal. Its accuracy and knockdown power made it competitive with many rifle cartridges. Soon rifles were being chambered for the .44 Magnum; Sturm, Ruger & Co. are building a short carbine for it. Ammunition manufacturers, recognizing a trend, are now making soft-point ammunition for the rifles which will also work in the handguns. Just the thing for your next buffalo hunt?

Dick Liechpatrick



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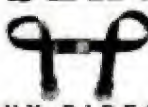
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Science overseas

By William Kreh

Wasps are now foaming at the mouth in Australia. Because they have been threatening valuable woodlands, foresters are trapping them by setting up glass wasp traps baited with a half pint of beer mixed with water. Wasps, it seems, like a wee nip.

Helium, a vital substance of the space age, has been found in the French Sahara at the natural gas field at In-Salah, about 600 miles south of Algiers. It's an important discovery, for the world's only other known sources are in Texas and Utah.

Nosey British biologists recently dropped microphones into the depths of the North Sea, off Cuxhaven, Germany, for 25 days to record the love call of the herring. The call, they discovered, was "peep, peep."

A salmon may have a keener sense of smell than a bloodhound. Canadian fisheries scientists plugged the nasal sacs of young sockeye salmon held in tanks, and discovered the fish couldn't find food put in the water for them. When the plugs were removed, though, the fish had no trouble.

From this and other experiments, ichthyologists conclude salmon literally smell their way up large rivers like the Fraser, in British Columbia, to spawn in the headwater streams where they, themselves, were spawned.

Their noses are sensitive to certain wet substances in quantities as low as one part in 800,000.

Radioactive grubs are now helping bug exterminators. Scientists at Canada's Biological Control Laboratory now find hidden nests of carpenter ants by treating insect grubs—a delicacy to the destructive ants—with radioactive iodine. Then they spread the "hot" bait around an infested building. Next day, they use Geiger counters to pinpoint locations of nests even though they're hidden behind walls or under floors.

A paint spray gun that works without air, has been developed by a firm in West Germany. A high-powered pump puts paint in the gun at pressures of 120 to 175

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atmospheres. Releasing the pressure in the can releases the paint through spray holes that are only a few tenths of a millimeter in diameter. The company says advantages of the system are a softer paint jet with little back splashing, no fog formation, and less wastage of paint.



The Russians claim they are protecting their vineyards by shooting down hailstorms with rockets. Rocket launchers are mounted at 11 places among the peaks surrounding the Alazanskaya Valley in Georgia. Radar sets scan approaching clouds. If hail is detected within them, the rockets are fired. They discharge an undisclosed chemical that causes the clouds to dump their hail on the mountains, rather than on the valley's vineyards. The grapes, which produce some of Russia's best wine, get only rain out of the storm.



King Henry VIII had a lousy regime and experts now can prove it. English archeologist Michael Green has found mummified bodies of fleas on the site of Henry VIII's palace of Whitehall. Fleas were found in remains of cloth and leather in a part of the palace that may have been a court dressmaker's rooms.



Needling sharks has become a specialty of two Australian skindivers. Ben Cropp and Ron Taylor devised a hypodermic needle which is recessed in a rod shot from a regular spear gun. Upon impact, the rod triggers the needle, forcing the point further into the shark. The needles are filled with strychnine nitrate—one jab kills a shark in less than 30 seconds. The men hope their device will help reduce the hazardous shark population in Australian waters.



Atomic engineers in London use a clever method to find bad leaks in buried hot-water heating systems. They drop a pill of irradiated sodium bicarbonate into the pipe and its progress is checked with scintillation counters and rate meters. When the ball stops moving, it means water has stopped and there is the leak.



Tuna fish really travel. Ichthyologists tagged a 350-pound blue tuna, caught off the Bahamas last June, with a small barbed shaft that carried a bright yellow streamer. In October, the streamer was picked up on the dock of a Norwegian fishing town after a boat had unloaded a big catch. Apparently the tuna had traveled a distance of 4500 miles in 133 days. ★ ★ ★

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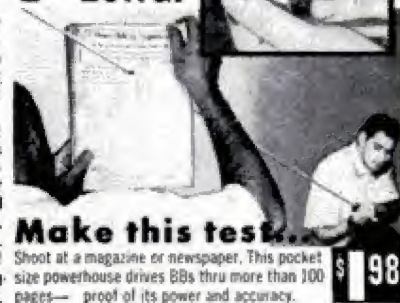
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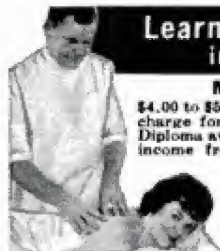
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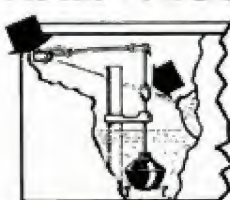
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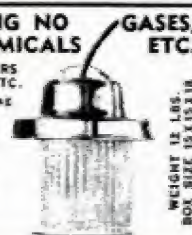
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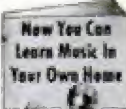


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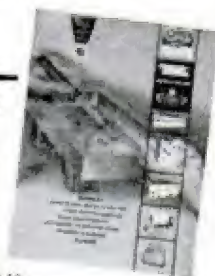


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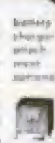


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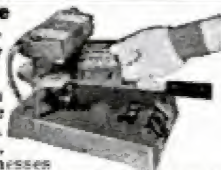
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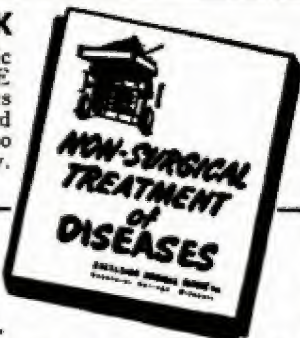
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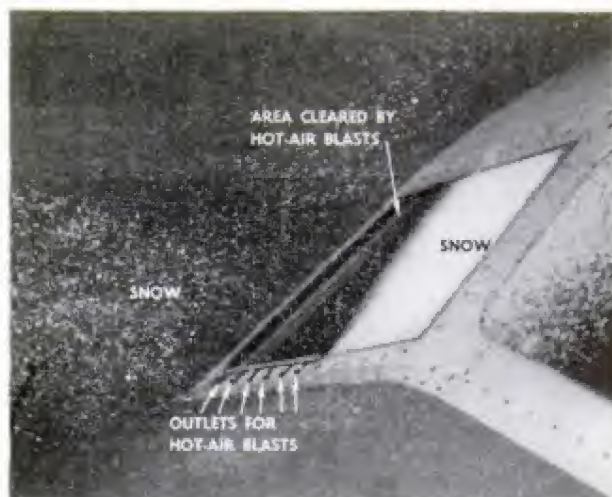
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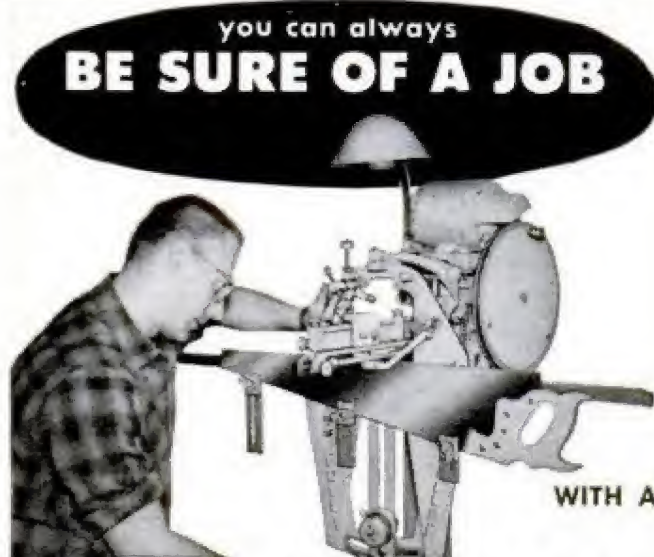


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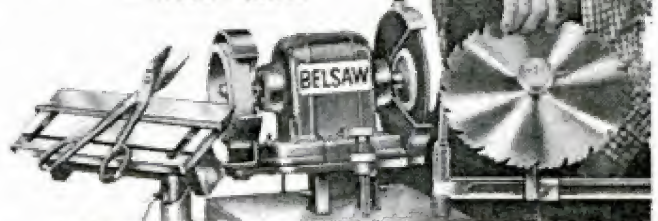
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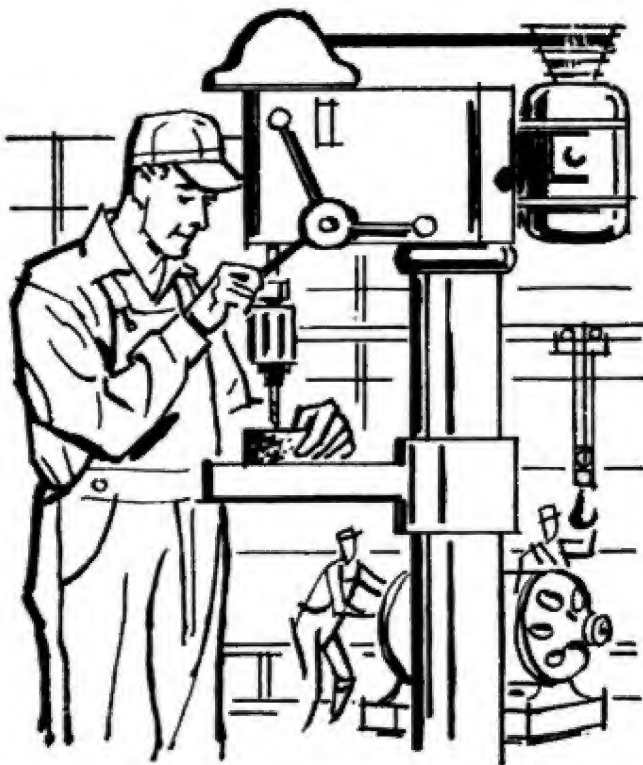
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“ANCHORMEN” OF INDUSTRY

Machining workers have been called the “anchormen” of our industrial team. Here are the reasons for their importance.

by B. Richard



Machining workers are craftsmen whose specialized skills are essential to American industry. They make most of the metal parts contained in manufactured products; and, even more important, they make the metal parts for the machines on our modern production lines.

Machine tool operators, tool and die makers and all-around machinists shape metal parts with precision accuracy, sometimes allowing for tolerances of only one ten-thousandth of an inch, and these parts are so important to industry that machining workers have been termed the “anchormen” of America’s industrial team by the National Association of Manufacturers.

In 1958, over one million workers were employed in skilled or semi-skilled machining occupations, and the United States Department of Labor predicts that there will be thousands of opportunities for new workers during the 1960’s.

Our growing population is expected to bring about a continuing increase in demand for metal consumer products such as cars, refrigerators, washing machines, heating equipment, stoves, freezers, etc. In addition, American industry is expected to increase its expenditures for new equipment, new plants and industrial machinery.

All of these products contain the results of the skilled machinist’s labors; and, as the demand for these products grows, the demand for machinists, the highly-trained “anchormen” of industry, will also grow.

Of the utmost importance to the strength of America is the contribution made by skilled machining workers to our national defense projects. The great use of metal in virtually all of our defensive weapons and the fact that this country will most likely be forced to expand the defense program, will increase even further employment opportunities in machining.

It is the job of a machinist to operate power-driven equipment which either cuts, shaves, grinds, or drills metal. The most common types of machine tools are lathes, grinding machines, boring mills, drilling machines, milling and broaching machines, shapers and planers.

As an example, a machine operator preparing a metal part for an automobile engine must be so accurate in his work that the parts he makes are interchangeable for fast, easy mass production. This makes the margin for error in his work very small, and he must be experienced in the use of such measuring instruments as the micrometer.

An all-round machinist is experienced in operating many different types of machine tools and is expected to plan and execute all operations required in turning out a machined product or part. A thorough knowledge of the strength and machining characteristics of metals and a complete background in the mathematics used in planning his work are required.

(Continued to page 50)



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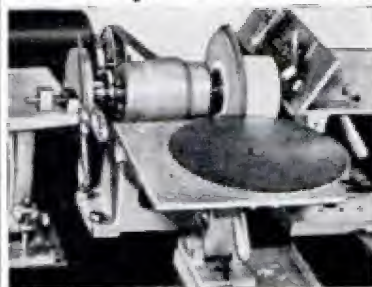
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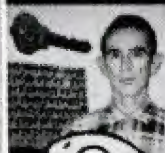
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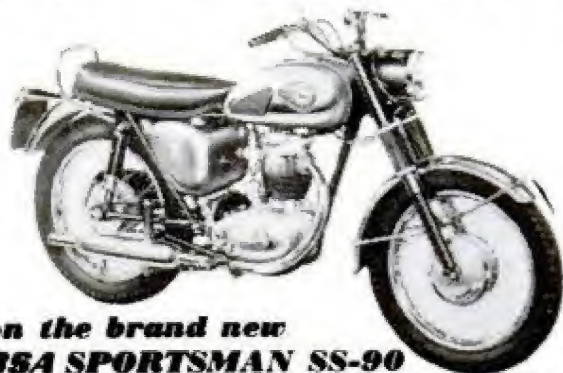
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Rainmaking is a bust in Arizona. Four years of seeding clouds with silver iodide produced the same amount of rain, statistically, on seeded as on nonseeded days.

One of a pair of days having suitable clouds was seeded on a random basis, and measurements on both days were made with rain gauges, radar and aerial cameras.

Dr. Louis Battan of Arizona University says the experiment indicates that small-scale atmospheric processes are not as important in governing amounts of rainfall as once suspected.

That warts are stubborn has just been confirmed by a 10-year study. Dr. Philip Anderson of the U. of Michigan's Department of Dermatology says warts frequently return at intervals ranging from 7 weeks to 10 years "despite caustics, curetting, electrosurgery, excisional surgery and cryotherapy (freezing)."

One bright spot: Warts which "recurred after one year were readily cured."

The most powerful siren in the world is roaring like a freight train in the Rocky Mountains near Denver. It is shooting 172 decibels of sound (1,000,000 times the level that causes ear pain) at components of space vehicles, testing their ability to survive the roar of giant rocket engines which can set up destructive vibrations.

Three researchers at Armour Research Foundation have tickled life into a tired question that has intrigued scientists (and magazine writers) for years: "Is there life on Mars?"

Could be. They subjected two kinds of bacteria—*Klebsiella pneumoniae* and *Clostridium botulinum* to a Martian environment: Placed in test tubes of crushed lava, they were subjected to varying temperatures and atmospheres. They survived.

Whether life with these bacteria would be worth living is another question. *Klebsiella* causes lobar pneumonia and *Clostridium* causes food poisoning.

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FIX Your own TV. Save 80%! Send for free illustrated chart showing how! We'll include giant electronics catalog. Zalytron, 220-M West 42 St., New York City.

TAPE Recorders hi-fi components. Sleep learning equipment, tapes. Unusual values. Free catalog. Dressner, 1523M Jericho Tpke, New Hyde Park, N. Y.

SAVE Dollars on radio, TV-tubes, parts at less than manufacturer's cost. 100% guaranteed! No rebrands, pulls. Request bargain bulletin. United Radio, 1000-M, Newark, N. J.

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CRYSTAL Radio kit \$1.00. Amplifier and speaker for same \$4.95. Catalogue. Clearco, Box 1638, Stuart, Florida.

OPERATE Car radios from 110 volts! Build battery eliminator for \$15.00. Complete plans \$1.00. Astro Electronics, 5212 Wea Dr., Kokomo, Indiana.

IONS. Do they improve well being? Facts, plans for building negative ionizer \$1.00. Tusp, Box 4114G, Cleveland 23, Ohio.

RADIO Troubles? Illustrated symptoms chart 20¢. Millett, PM, 5208 Longton, Cleveland 24, Ohio.

TRANSISTOR Radios repaired. \$5.00 covers parts, labor, return postage. Mail radio and \$5.00 to Mannington TV, 23 Pyles Ave., Mannington, W. Va. Guaranteed.

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FANTASTIC Profits in new coins. Small investments. No risk. Free details. How Publications, 1612-N Sterling, Brooklyn 33, New York.

CLIP Newspaper items for plastic laminating. Exclusive territory. Details. Marlow, Holbrook, N. Y.

BIG Profits operating amazing mail-order method. \$2.00. Money-back guarantee. Barber, 1823 Augusta Dr., Lexington, Ky.

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START Your own business on credit. U.S. only. Your own boss. 1344 dealers sold \$5,000 to \$25,500 in 1960. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. D-U-PPM, Freeport, Ill.

READ "Mailorder Laws and Regulations." Explains licenses, taxes and legal preparations necessary before starting business. \$2.00. Recommended especially for beginners. Neil H. Tasker, Shamokin, Pennsylvania.

MUSHROOM Spawn first class, (seed) to plant 50 square feet \$10.50, to plant 100 square feet \$16.00. Free instructions and suggested market where to sell your mushrooms at highest prices are furnished with each order. Send full cash payment with order for prompt prepaid shipment. Thomas Company, 1019—6th North, Seattle, Wash.

OPERATE Paying mail order business from home. Eye opening details. Kukitz, 369 Spruce St., Coplay, Penna.

MAILORDER. America's most unique no cost beginner's plan. Armstrong's, 154-A Darrington S.W., Washington 24, D. C.

RE-REFINE Used oil. Drawings, instructions, \$3.00. Pacific, Box 311, Gresham, Oregon.

FREE Sample for magic beautiful green lawn growth. Free catalog showing how to make big money at home business. Sure-grow Company, 1019—6th North, Seattle, Wash.

SECRETS! Secrets! Mail order success revealed by internationally famous expert who discovered how to make home business fortunes. Beginners: Get free copy "How to Make Money in Mail Order." Disclosed free advertising, profitable products, everything! No obligation. Write Mailco, 1554 Sepulveda, Dept. D704, Los Angeles 25.

\$34.70 TWO Hours manufacturing concrete products. No selling. Castings #3. Box 1721, Rapid City, South Dakota.

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\$400 PER Week profit possible with amazing 5 pound invention that prints on cloth, wood, glass, plastics, felt, metal, ceramics; flat, curved surfaces. Free facts and samples. Screen Print, Los Angeles 61-2C4.

LEARN Landscaping and the growing of plants. Start a profitable business part or full time. Free information without obligation. National Landscape Institute, Dept. MC-42, 11826 San Vicente Blvd., Los Angeles 49, Calif.

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FREE Book "990 Successful, Little-Known Businesses." Work home! Plymouth-572A, Brooklyn 4, New York.

CATALOGS. Your name imprinted. \$1.00. Sample 25¢. Stars, Box 3155, Pensacola, Florida.

FREE! "39 Easy Home Business Ideas." Merkins, 30 Ontario, Terryville, N. Y.

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RE-CAST Junk batteries into new. Latest achievements. Battery Laboratories, Bayou LaBatre, Alabama.

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INTERNATIONAL Mailorder business made easy. Complete setup service, not just instructions. Hermes, 152 West 42, New York City 36.

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232 PAGE Catalog \$2.00. Laboratory Materials, 7319 Vincennes, Chicago, Ill.

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SPARETIME Profit (men or women) taking orders for small Hoot Gibson California Ranchos. Literature on request. Tracy Wiley, 440 So. Atlantic, Monterey Park, California.

YOUR Ad in this space will get some good agents for you. Yes, I'll prove it. Write for Folder "A" right now. P. W. Johnson, Classified Advertising Manager, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

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WHOLESALE Bargains. Send postcard for catalog. Tod, Box 101, Mountainville, N. Y.

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NATIONALLY Advertised products wholesale. Send products name-model for quotation. Coats, Box 1247-A, Ontario, California.

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Alcoa does not make colored aluminum paint, but we'll be happy to refer you to reputable manufacturers who do. Send coupon today for our informative booklets.

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APRIL 1962

What's New in High Fidelity
by Fred Honig.
Former Editor of Hi-Fi Guide, well-known writer and authority on high fidelity

Ingenuity in Cabinetry

You don't need cabinetry for high fidelity components—they're self-contained and can be put almost anywhere. However, if you do want to house your components in a cabinet, you don't have to buy an expensive piece of furniture. You can build it yourself without starting from scratch. Many of the old, ready-to-be-discarded china cabinets, end tables, old TV consoles, etc., can, with a little ingenuity, be rebuilt into handsome, functional component cabinets that will house your FM stereo tuner, amplifier and record or tape player. Today's speaker systems, of course, already come in beautiful woods and in a variety of sizes to match any room's decor and acoustics.



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ALTEC-LANSING
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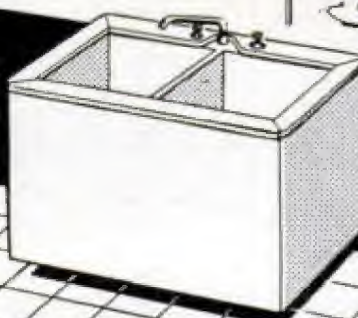
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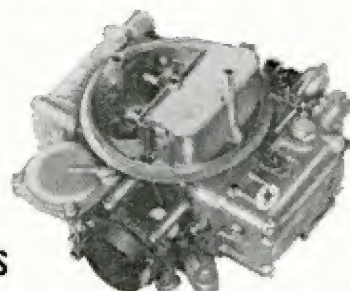
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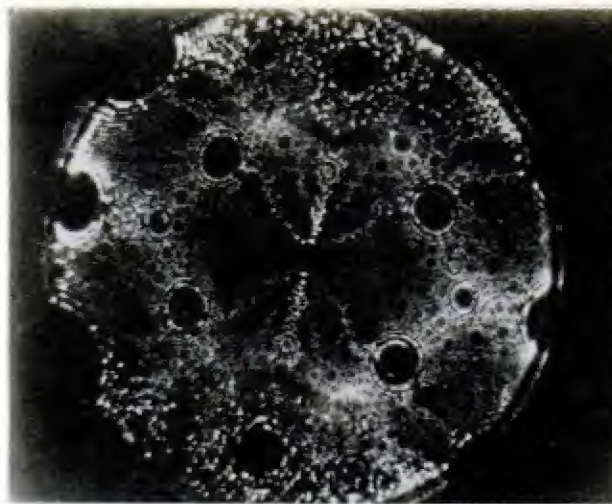
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A needle of tungsten, two-millionths-of-an-inch thick, for example, is placed in a container of helium. Electrical fields are generated from the tip of the tungsten by charging it with 500 million volts. Electrons are stripped from helium atoms, leaving them with positive charges.

Ionization takes place at the various tungsten atoms; helium ions so formed strike a phosphorescent screen, giving off dots of light. These display the geometric pattern of the metal crystal, allowing the key atoms to show on the screen.

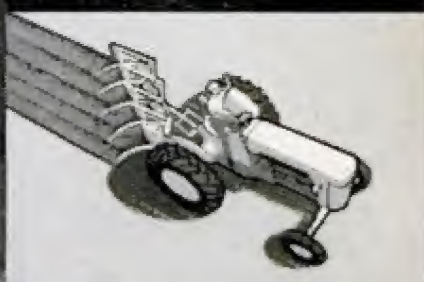
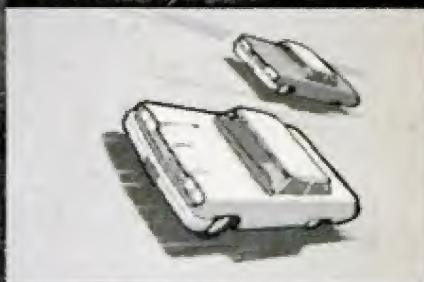
The 'scope is not expensive, but is difficult to assemble.



Cool Tool for Hot Caps

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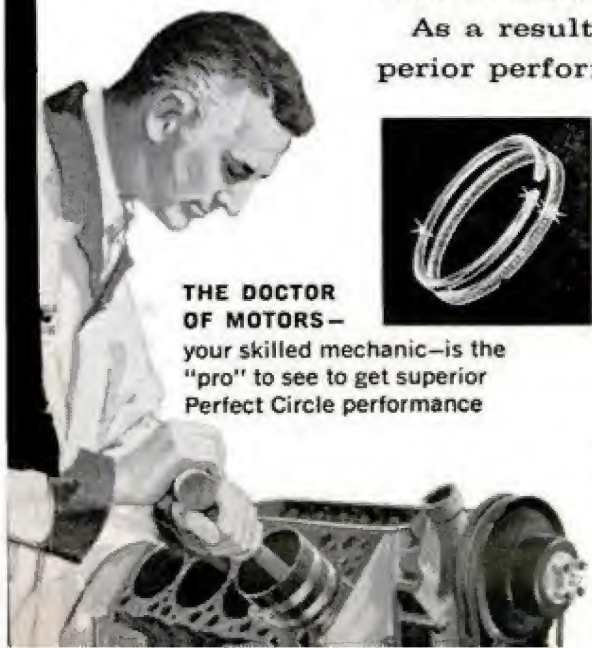
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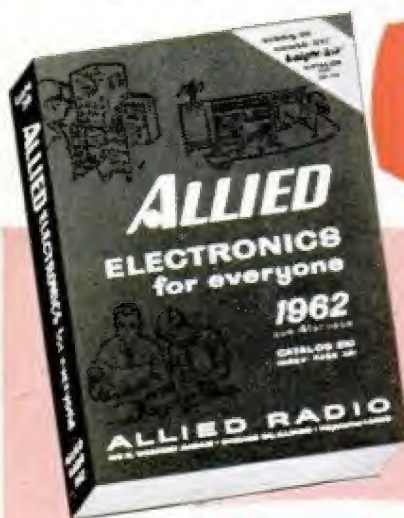
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Sidelights on aviation

Flotation rigs which prevent the sinking of Mercury spacecraft are discussed in *The Celebrated Jumping Frogs*, an article beginning on page 104. Still one more emergency flotation device has now been accepted for use with the capsule.

On the second suborbital flight the capsule sank after the hatch blew open prematurely and water poured in. Now, if this happens and the helicopter has to drop the spacecraft because it is too heavy to lift, an inflatable bag attached to the lifting cable will automatically drop from the helicopter when the cable is disengaged. As it separates, a static cord actuates a CO₂ gas cylinder which immediately inflates the bag.

Even though the capsule sinks, it is still attached to the pear-shaped bag via the cable. The bag has a buoyancy of more than 2500 pounds, more than enough to support the capsule. It will continue to float until another recovery attempt can be made.

Random comparisons show that air traffic in the United States is far ahead of Europe.

London, the busiest in Europe with 146,506 plane movements in 1961, is behind Indianapolis, Ind., which had 148,595 and was well down on the U. S. list.

Chicago's Midway, last year the world's busiest with 315,487 movements, may finally lose its title this year. Almost all the major airlines have moved their entire operations to Midway's neighbor field, Chicago-O'Hare, because O'Hare has longer runways for jet traffic. In size, O'Hare is already far larger than any airport anywhere. It covers more than 6500 acres. Midway has 640.

Amateur aircraft builders may now get all the rules necessary to comply with civil-air regulations for certification and operation of homemade aircraft in one booklet, *Flight Standards Service Release No. 456*. It is available free from any Federal Aviation Agency office.

"Hands off" helicopter flights may now be possible with an automatic-pilot system developed for the Army. It gives the helicopter pilot a stable platform and frees him for other duties such as aiming missiles.

Kevin V. Brown

POPULAR MECHANICS



SELF-SCRUBBER

WHAT YOU SHOULD KNOW ABOUT THE SPARK PLUG THAT CLEANS ITSELF WHILE YOU DRIVE.

First off, it cleans itself with the heat of your engine. Autolite Power Tip spark plugs extend a bit deeper into your combustion chamber. Not much deeper. Just enough so that potentially

harmful deposits get little chance to accumulate. They're burned right up and out the tailpipe. That's why your Autolite spark plugs stay cleaner.

That is why your car runs better. That is also why you don't have to buy so much gasoline.

One other point you should know about the

spark plug that cleans itself while you drive. Ford Motor Company now installs Autolite Power Tip spark plugs as original equipment on every new car it builds. Other manufacturers use them too.

Next time you change spark plugs, stick in some self-scrubbers . . . some Autolite spark plugs.

SPARK PLUGS • BATTERIES • SERVICE PARTS
 **AUTOLITE**
 THE NAME TO REMEMBER WHEN YOU CARE FOR YOUR CAR



World-Famous York Testing Laboratory Proves:

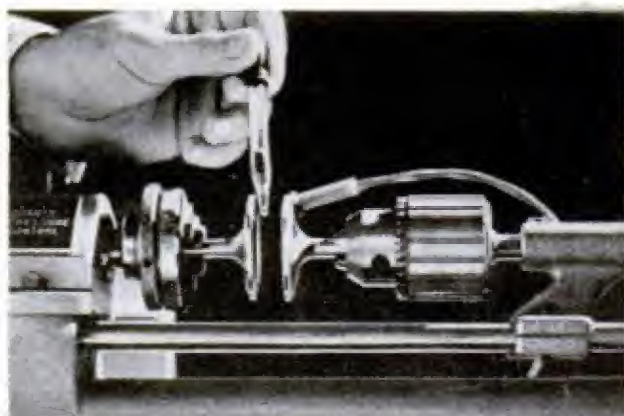
YOU CAN SAVE UP TO **400** MILES OF ENGINE WEAR EVERY **1000** MILES YOU DRIVE!

Whether you use premium motor oil or economy oil in your car, the addition of BARD AHL can reduce engine wear by 10 to 40 per cent and make your car run smoother and quieter—so proved York Research Corporation, Stamford, Connecticut, after exhaustive six-month test.

"Frankly, gentlemen, we didn't believe Bardahl could make that difference!" Those were the opening words of the famous York research engineers when they finished testing the country's best-known motor oil additive. For 180 days engineers put BARD AHL to the most exacting laboratory test.

On a delicate jeweler's lathe, the researchers mounted two finely honed engine valves facing each other. By rotating one valve and pressing the two metal surfaces together, they simulated a friction condition that occurs thousands of times each minute in today's automobile engine.

Day after day, hour after hour, tiny drops of oil—premium grade oil, low grade oil, contaminated oil, and oil samples with BARD AHL added—were placed between the two rubbing valves. Thousands of test runs were recorded.



Thousands of oil samples were tested on this delicate jeweler's lathe

The valves were cleaned and re-cleaned. The instruments checked and re-checked. Finally, the York engineers were satisfied they had eliminated every chance of error. The results were uncontestable.

When added to regular crankcase oil, Bardahl will reduce wear 10 to 40 per cent. (Research technicians say the average motorist, taking normal care of his car, should expect at least a 20% saving.)

POPULAR MECHANICS

Does This Mean a Substantial Savings in Dollars and Cents?

Yes. When you put BARD AHL in your crankcase, you put dollars back in your pocket. These are dollars you would otherwise pay out for more frequent repairs and overhauls. Let's assume you buy a new car and begin adding BARD AHL to your oil with every oil change. If you travel 10,000 miles each year for the next four years, your speedometer may read 40,000 miles but, thanks to BARD AHL, the actual wear age of your engine may be only 30,000 miles.

Your car will also be peppier, run smoother, be free of many irritating engine noises. BARD AHL helps remove sludge and gum which foul up valves and hydraulic lifters, and make your engine sluggish. You'll feel more power and get more mileage.

York Engineers Reported:

"York has been able to produce evidence that BARD AHL Additive Motor Oil, when used with various regular and premium grade motor oils, is able to effectively reduce friction and temperature and in this way ultimately reduce wear in an automobile engine between 10% and 40% on such critical area parts as rocker arm and shaft, valves and guides, hydraulic lifters, tappets and cams, fuel pump arm and eccentric and oil pump drive gear; as well as reduce wear on other parts, such as main bearings, rod bearings, piston rings, pins, connecting rod bearings and cylinder walls."

December 11, 1961



*What is
this magic
additive
called
BARD AHL?*

There is nothing so magical about the idea that new chemical compounds can improve ordinary hydrocarbon oils taken from the earth. BARD AHL happens to be an unusual blend of such chemicals and fine oil. It carries an S.A.E. viscosity rating and you could use it "straight" in your crankcase. Fortunately you need only a 20% mixture, or one quart of BARD AHL with each four quarts of your normal oil.

But the real secret of BARD AHL is its "polar attraction" formula. Leading scientists, studying the reaction of metals to friction, discovered that certain substances have a molecular attraction for metal. These substances cling to metal surfaces, stubbornly refuse to get squeezed out or burn off. BARD AHL is this type of extreme-pressure lubricant.

So, if you're one of the millions of motorists who still treasure a finely tuned engine—who still wince at the thought of unnecessary wear—one answer is BARD AHL. Add one quart of BARD AHL to your crankcase with each oil change. And don't forget to add BARD AHL TOP OIL to your gas tank with each 10 gallons of gas. BARD AHL TOP OIL lubricates the oil-starved upper cylinders, reduces carbon deposits, and frees sticky valves.

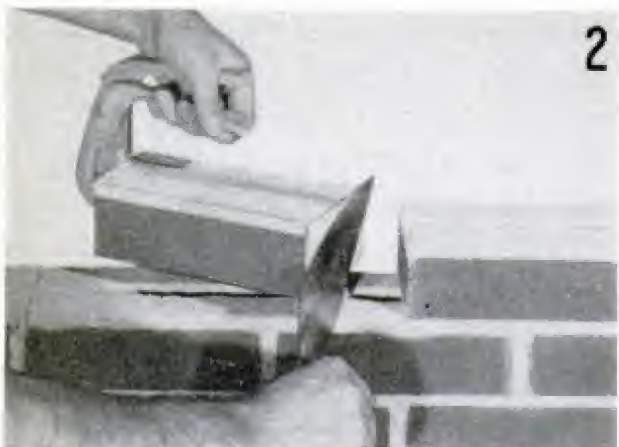
FOR MORE TECHNICAL DATA ON BARD AHL TEST, WRITE YORK RESEARCH CORPORATION, 1 RESEARCH DRIVE, STAMFORD, CONNECTICUT, U.S.A.

Shopping for tools



1

1. LONG STEEL TAPES in butt-end cases permit you to make accurate inside-outside measurements up to 100 ft. Additional features include attached belt clip and self-adjusting end hook which automatically compensates for its own thickness. The 50-ft. tape sells for \$3.99; a larger 100-ft. size for \$5.99. Evans Rule Co., 400 Trumbull St., Elizabeth, N. J.



2

2. BRICKLAYER'S TOOL allows you to lay bricks without touching them, and makes perfectly spaced, even joints. Called "Automason," the tool makes it possible to butter bricks uniformly without mortar waste. Tool designed for regular bricks costs \$4.80; for special Roman size, price is \$5.20 ppd. Made by Port Austin Level & Tool Mfg. Co., Port Austin, Mich.

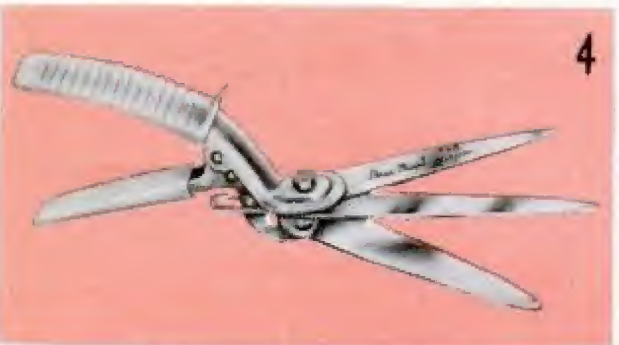


3

3. BALL-BEARING 9-IN. ARBOR SAW comes complete in one compact package which includes a 1-hp. electric motor, belt, pulley, cord, plug, switch and a rugged all-steel stand plus two cast-iron table extensions. The complete unit, ready to plug in and operate, sells for \$191.85. Saw is manufactured by Toolcraft Corp., 700 Plainfield St., Springfield, Mass.

4. TRIPLE-BLADED GRASS SHEARS enable you to trim grass in half the time. With three blades, both side blades work against the center blade making it possible to cut an area twice the size of that cut with normal shears. Featuring soft vinyl grips, it's priced at \$3.50 and marketed by Hardware and Industrial Tool Co., 20th & Oxford St., Philadelphia, Pa.

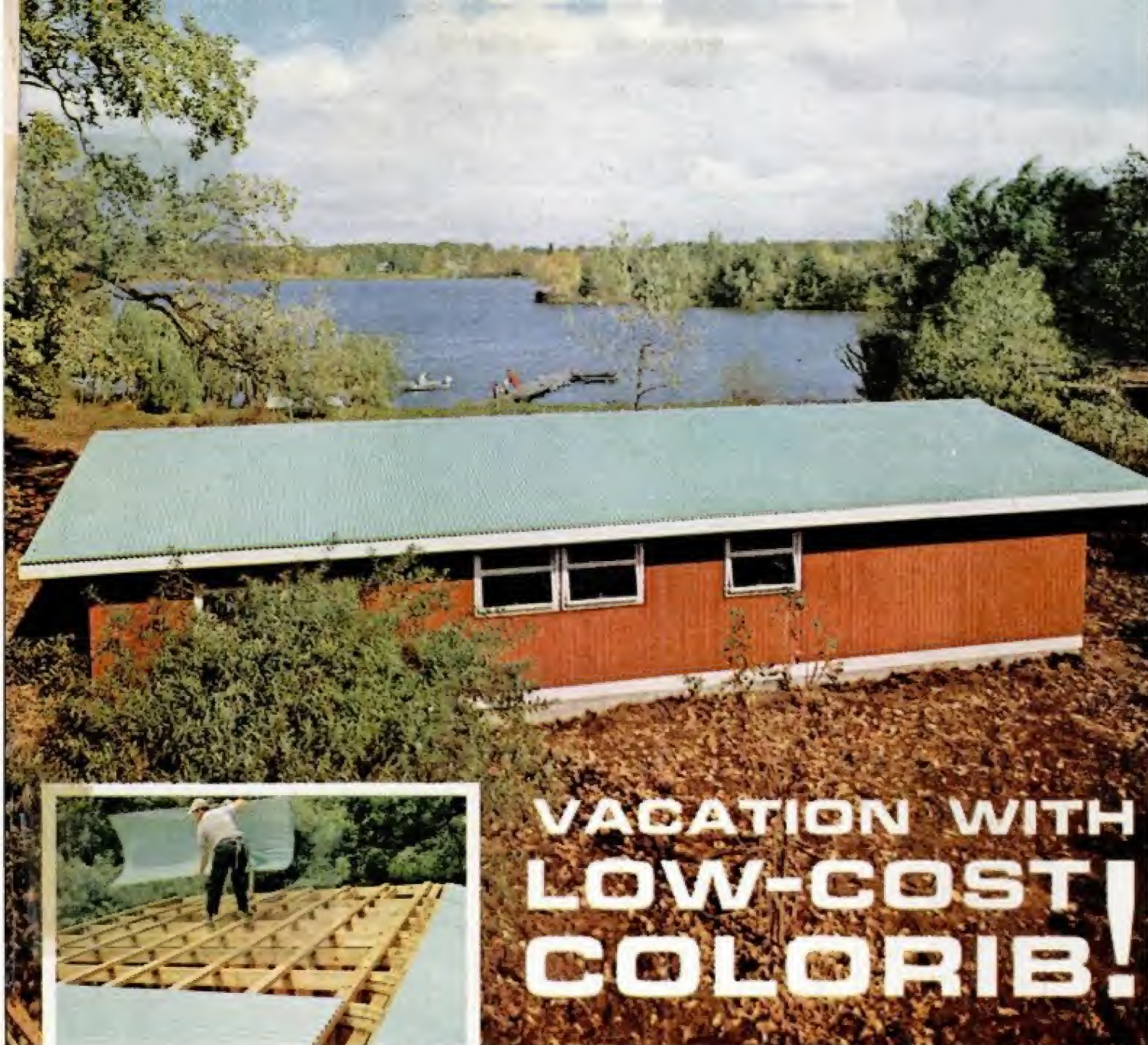
5. HIGH-SPEED HAND GRINDER develops 27,000 r.p.m. and can sustain a high torque under load. Industrially rated, the unit is designed to cover a wide range of applications including grinding, drilling, carving, polishing, routing, sanding, etc. It includes a 3-wire ground cord for safety and sells for \$29.95 with steel case. Dremel Manufacturing Co., Racine, Wis.



4



5



VACATION WITH LOW-COST! COLORIB!

BUILD patios, fences, boathouses and vacation homes with Alcoa® Aluminum Colorib® Panels.

GOES UP FAST AND EASY—Use simple hand tools. Heavy-gage yet lightweight, covers fast.

ONCE UP, NO UPKEEP—Won't rust, rot or warp.

TOUGH AND HANDSOME—Finish won't chip, crack, flake, peel or blister. Baked enamel Colorib Panels stand up to wind, rain and snow.

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with **Fred Astaire** as host Tuesday Evenings, ABC-TV

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ALUMINUM COMPANY OF AMERICA
891-D ALCOA BUILDING
PITTSBURGH 19, PA.

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ADDRESS _____

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ALCOA ALUMINUM

COLORIB PANELS

Pleasure is a Chesterfield



IF YOU SMOKE FOR PLEASURE and not just from habit, get to know the satisfaction of Chesterfield King. Your pleasure is long and true and filter-free. For Chesterfield is 21 vintage tobaccos grown mild, aged mild, blended mild —*not* filtered mild. Millions of pleasure smokers say . . . **"THEY SATISFY."**

21 GREAT TOBACCOS make 20 WONDERFUL SMOKES!!

THE SAME GREAT TOBACCOS ARE IN BOTH REGULAR CHESTERFIELD AND CHESTERFIELD KING.

'Sputniks' Orbit the Supermart

Your wife might be paying more money for less groceries because they come in overblown, underweight and deceptive packages

"BRING HOME a loaf of bread," my wife called out and, at the supermarket, I grabbed a big sandwich loaf at 29 cents, six cents cheaper than the others.

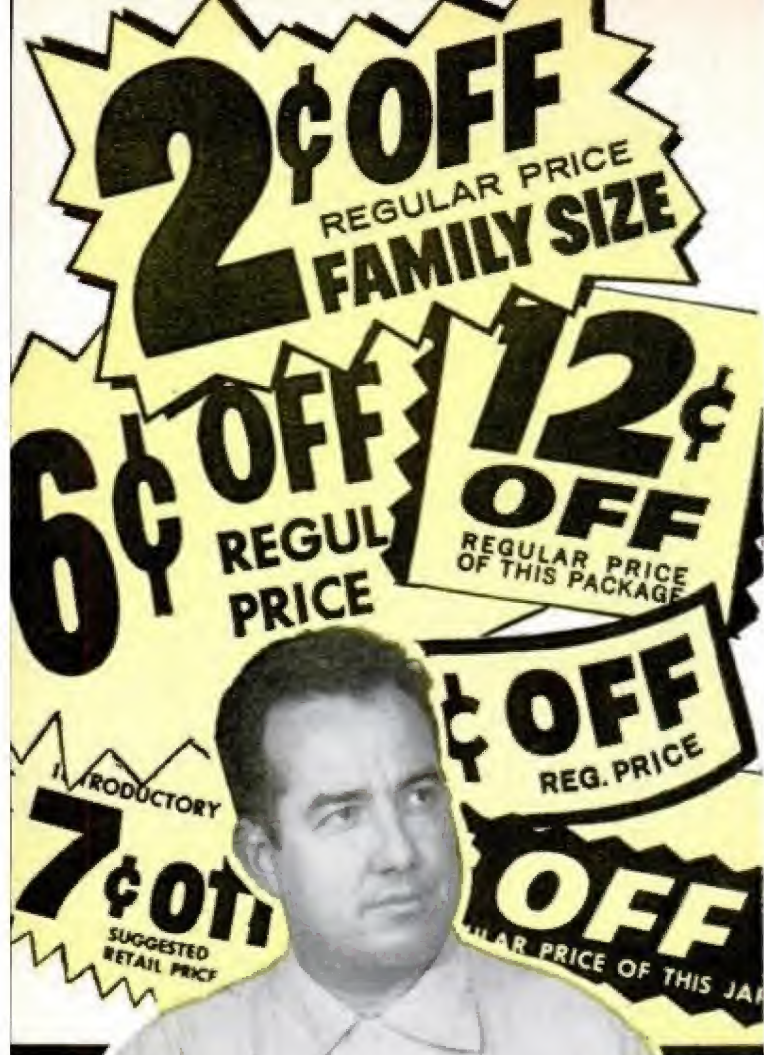
But it seemed lighter than usual. I hunted for the net-weight declaration and couldn't find it. I took off my bifocals and squinted and turned the loaf over and over. Ah, there it was! Could have used a magnifying glass. Fifteen ounces, it said. But the other, smaller loaves on the shelf weighed 22 ounces. The cheap loaf was the most expensive per ounce.

"It's a 'sputnik'," the grocer commented. "The bakery puts enough dough for a standard loaf into a large pan, then blows it up to fit."

Another time I wanted some real Swiss cheese and I hunted through the cheese counter and thought I found it. When I got

By Thomas E. Stimson, Jr.





DECEPTIVE PACKAGE of corned beef, when opened, shows that beef occupied less than half the packet

home, I saw the wrapper said, in tiny print, "Imported from Denmark."

"Sucker!" I told myself.

That same week, my wife brought home a package of "Large Fancy Walnuts." Most of them were small and many of them were wormy. The worms may have been fancy, but we didn't try them.

I bought a candy bar, and it was mostly cardboard wrapper. I bought a packet of smoked salmon and it contained just enough salmon to fill the small plastic window. I bought some sliced bacon and it was all white fat except for a thin ridge of meat.

What's going on, anyway? Is everyone out to gyp me? I complained to an official and he said, "Ali Baba's Forty Thieves were pikers compared to some people in the food-packaging business. There are lots of honest packagers, of course. And there are others who stay awake nights thinking up new ways to trick you!"

Once upon a time you asked your grocer for half a pound of this and three pounds of that and he filled your order while you waited. Today, most items in food stores are prepacked. An estimate is that more than 6000 kinds of packages confront the shopper, counting all the different foods,



DECEPTIVE SIZE of bread shows one loaf, as large as other, actually weighs nearly a half-pound less



HONEST SLACK results from vibration during shipment. Soap powder overfills box, but settles in transit

brands and sizes. Each package is a silent salesman that fights for the customer's attention. Sometimes very dubious tactics are used.

Well over a year ago an opinion survey reported that housewives had two major complaints about packaging. One was that the manufacturers were trying to fool them by packing a small amount of product into an oversize package, and the other was that there was altogether too much advertising on packages, taking up space that could be better used for directions and descriptions.

So many people have been complaining about deceptive packaging that the government has taken notice of it. A subcommittee of the U. S. Senate under Sen. Philip A. Hart of Michigan has been holding hearings to investigate the way that the labeling and packaging of food and household products affect the consumer.

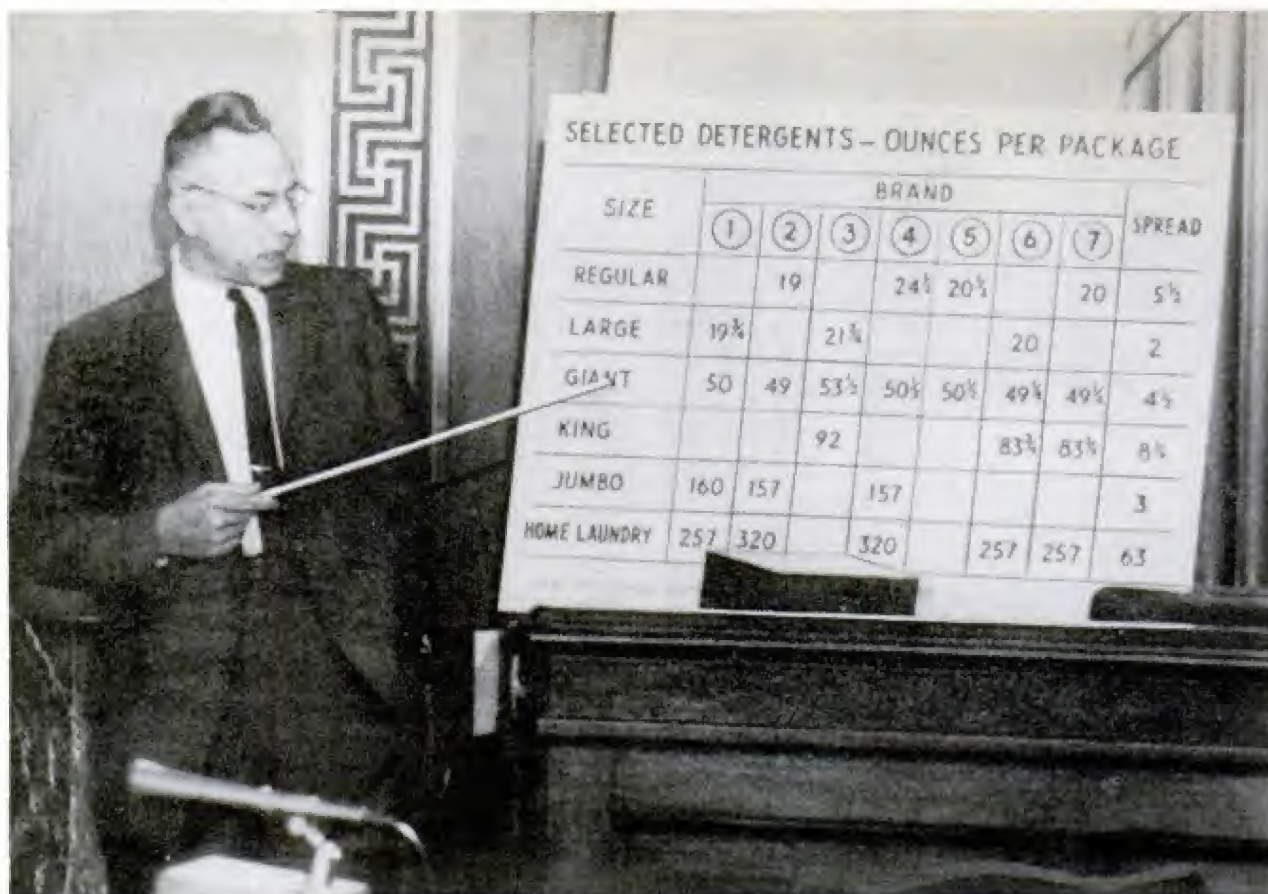
One common complaint to the subcommittee was that shoppers are bewildered by such claims as "Jumbo Half-Quart" and "Big Two Ounce" amounts. Ordinary horse sense tells one that a jumbo half-quart is, after all, only a pint, and that two ounces don't weigh any more just because they are called "big."

"Small, medium and large are becoming things of the past," one witness said in essence. "Today it's large, super and giant. Large is the smallest you can get!"

Another kind of exaggeration can be found among frozen foods. One package of a frozen vegetable weighing 12 ounces may have a reasonable "two servings" printed on it, while another that weighs only nine ounces may state "feeds four." Feeds four what, midgets?

A big complaint was that you don't get as much for the same amount of money as you used to. A can of baby food contains a quarter ounce less than before, with no reduction in price. A box of cake mix is down one ounce, and a cereal box that used to contain 12 ounces now holds 10¼ ounces. What was once a pint of vinegar is down to 12 or 14 ounces, and so on.

Every story has two sides and in this case the packager's side certainly has some merit. A company that is faced with rising costs is going to raise its prices, that's sure. One way is to raise the price of its standard package. Another way is to reduce the quantity in the package and continue to sell it at the old price. Obviously, a company that raises its price is at a disadvan-



DECEPTIVE NAMES mean different things to different manufacturers. "Giant," "King," "Jumbo" vary in weight

tage if its competitors decide to "package to the old price." So, almost without exception, packagers have chosen the latter path.

Senator Hart made it clear that the subcommittee is not denying a manufacturer the right to adjust his prices.

Other witnesses took exception to the trend toward packaging in odd amounts. In

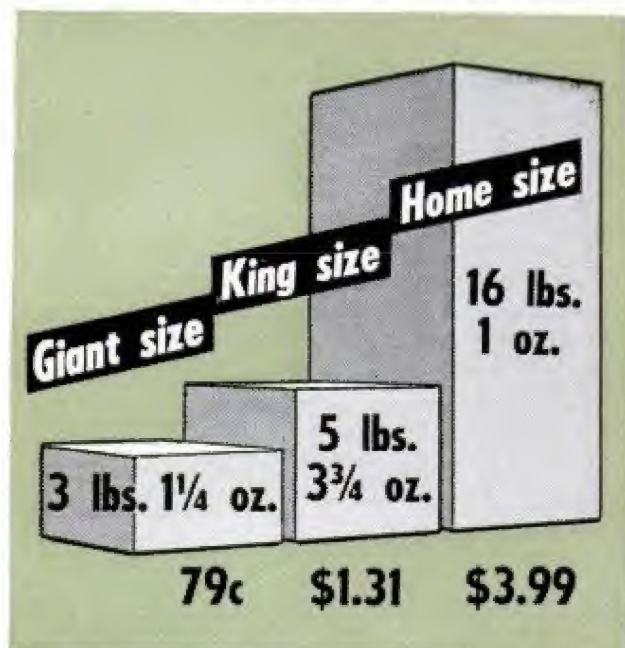
some commodities it's impossible to buy by the pound any more.

"The giant size of this brand is 3 lb.-1¼ oz. for 79 cents. King size is 5 lb.-3¾ oz. for \$1.31. Home-laundry size is 16 lb.-1 oz. for \$3.99," one witness testified. "How do you compare them, pricewise?"

(Continued to page 238)

Which one is the best buy?

COMPLICATED WEIGHTS can be compared on handy "consumer's computer" which shows which costs least





By Jim Whipple



Horsepower Hikeup—Any Number Can Play. What Provokes Detroit's Loudest Silence?

First reports from Ford show an upbeat takeoff for the **Fairlane**. Reported as of February 1st were 62,000 sales since the October '61 introduction. That's pretty good going for a car that is offered only in two and four-door sedans.

Unofficial word from a Ford executive—"We'll have **Fairlane** station wagons by late summer." They certainly should, because the **Fairlane** itself is aimed at the medium income family, \$7000 to \$10,000-a-year folks, and these are the very people who go for wagons priced below \$3000.

Incidentally, **Fairlane** buyers are voting heavily for the V8 engine, as sales are running 80 percent as of now. According to Ford Division's head man Lee Iacocca, this was a surprise. They had expected not much more than 50-60 percent. Mr. Iacocca admitted that the **Fairlane's** standard 101-horsepower Six might "leave something to be desired in the way of performance." Just in case some people feel that way about the 143-horsepower V8, Ford has hastened to add one with 39 more cubic inches displacement as an option.

This gives the **Fairlane** buyer 164 horsepower to play with, which takes us back about seven years to the 1954 Ford, a similar-to-**Fairlane**-sized car which started with a new, 130-horsepower V8 which promptly jumped to 162 on the '55 model. (Isn't this where we came in?)

This 260-cubic-inch engine was scheduled for the '63 **Fairlane**, but public interest spurred Ford to action this spring.

Whatever Ford does it's a cinch that Chevrolet isn't far behind. In this matter they're ahead as they've made the 327-cubic-inch V8 available in the **Chevy II** just as Ed Cole promised (**PM** November '61, p. 110). This rig makes up a living bomb which will reach 60 m.p.h. in about 6.5 seconds.

Chrysler Corporation is also hip deep in horsepower with a dual four-barrel carbureted job with a new aluminum intake manifold built in one piece and embodying 15-inch ram tubes tuned for high output.

This beautiful brute is rated at 410 horsepower from 413 cubic inches with 11-to-1 compression ratio burning superpremium

gasoline. Dodge calls it the Ram Charger, while on **Plymouths** it's the Super Stock 413.

This engine is a factory option available in May. As far as we know it will not fit under the hood of a **Valiant** or **Lancer**.

Over at Buick, however, there's a refreshing (to us, anyway) trend away from the complexities of hyped horsepower. The buyer demand for the **Buick Special** with V6 engine has the plant scrambling to catch up, while there are plenty of aluminum V8s for all.

The loudest silence around Detroit these days comes when you ask about two-ply tires. These light, flexible shoes were going on all the 13-inch rims of compacts and even headed for, so the industry spokesmen said last year, some not-so-compact cars.

A recent check by **PM** of brand-new compacts revealed no visible letters or ciphers on their casings indicating how many plies they had. Formerly these were two-ply marked "4-ply rating."

Word from a top executive in tire marketing (not connected with a rubber company) is that there were problems. It seems that when tires were overloaded the sidewalls weakened at just above the bead and too many failures occurred.

So, to play safe, everybody went to four plies. According to our source, the two-ply 13-inch tires offered a slightly softer ride and a saving of less than 50 cents each in cost for the automakers. Replacement tires sold by the rubber companies for compacts were always 4-ply.

Dolling up the compacts, seems to be a sweeping trend as American Motors adds simulated wood trim to a **Rambler** station wagon while Ford presents us with the ultimate **Falcon**, (price not available at press time), the **Futura Sports**, a two-door job with leatherlike vinyl-covered **Thunderbird**-styled roof, four-speed floor shift and, sakes alive, honest-to-Pete knockoff wire wheels.

The four-speed box comes from Ford of England's **Zephyr** and, says a Ford executive, should be reasonably priced at around \$75. What a happy thought! ★ ★ ★

Lift-off Hardtop



IN LESS THAN A MINUTE, the Le Mans fiberglass top changes a convertible to a snug, weatherproof hardtop



TIGHT FIT, good seal on Pontiac convertible, left, gives watertight comfort like sister hardtop, at right

FRONT LATCHES use ordinary soft top hook fittings supplied with car to fasten top to windshield frame

REAR IS CLAMPED with two spring-loaded hooks. Top was tested at speed with these unhooked





TOP HAS GRAINED exterior surfaces and a white rubber edge molding. Rear window uses laminated safety glass **ONE-PIECE CONSTRUCTION** will support a ski rack, several hundred pounds of luggage or a light boat



CONVERTIBLE OWNERS can now give their cars a "dual personality" treatment that used to be enjoyed only by drivers of certain personal cars and imports. Le Mans, Inc., a San Diego firm, has engineered a light-weight fiberglass hardtop that turns full-size convertibles into snug, closed cars.

No drilling or modification of any kind is required to adapt the top and as it weighs but 80 lb., two persons can easily lift it into place. At the first sign of bad weather, it can be buckled on in less than a minute to banish drafts and help keep the interior warmer than usual in winter.

The Le Mans top is made of multilayers of fiberglass and its precise molding creates a fit and weatherproof seal the maker claims will allow a car fitted with it to come through a mechanical car wash bone-dry.

The limousine-style rear window is made of laminated safety glass and cranking one of the doors or quarter windows down suddenly won't blow it out. Both the interior and exterior are scratch-resistant, grained surfaces that are not affected by the elements and will not discolor.

Two models (at \$395, and \$435) fit all Chevrolet, Pontiac, Buick, Oldsmobile and Cadillac full-size convertibles. The maker plans to offer a top for convertibles in the Ford family, beginning with the '63 line, as well as for many of the American compacts.

Le Mans, Inc. plans to have GM dealers sell the top in a choice of black or white (or prime coat), with a matching or contrasting underside. It would be ordered as any other accessory right with the purchase of a new car.—*Dick Williford*

Falcon's Easy Driving, High Gas Mileage Please Owners

Marginal and boldface comments by Jim Whipple, PM's Auto Editor



STATUS SYMBOLS went compact when Falcon introduced the handsome yet practical Squire wagon with the imitation wood paneling like its Galaxie big brother. Like owners, PM found Falcon a great go-in-snow car

Falcon's success over Corvair was due to more interior room, conventional engineering. It outsold → Valiant partly because of latter's off-beat styling. A greater number of dealers helps it trump Rambler's ace

PM's test Squire bore a highly "uncompact" → sticker price of \$3200!

Somehow these dooded-up economy cars like → Falcon remind us of nice little girls wearing Mom's dress, shoes and lipstick on Halloween

HAS SUCCESS SPOILED Ford's Falcon? Because there's no doubt that 1,100,000 copies sold since this practical compact first appeared, spell just that . . . success of the highest order. Falcon has outsold Rambler, itself the father of compacts, as well as more recent arrivals, Corvair and Valiant.

For a look at the facts we compared results of this current owners report with one from owners of the 1960 Falcon (PM, April, 1960, p. 98). In passing, it's worth noting differences in the car itself.

The current Falcon is a far more sophisticated product than the version of just 24 months ago. That early Falcon was available as a two or four-door sedan (wagons came later in the year) with a single 85-hp. engine and choice of either manual or automatic transmission.

Today, there are the same sedans, conventional two and four-door wagons, a camper-type wagon and the luxurious Squire wagon—a four-door with simulated wood paneling, roof rack, bucket seats and luxury carpet which PM used as a test car to backstop this report. There's even a cute little pickup truck called the Ranchero, plus the elegant, newly roofed bucket-seated sports coupe, Futura.

But beneath this latter day finery we find much the same sensible simplicity and efficiency that marked the car from the start. There's still neither power steering nor power brakes; you must unlatch doors for summer ventilation and regulate the warmup via a manual choke.

Not tinkering with the basic formula has kept public acceptance high, as owners still like their Falcons.

A solid 62.8 percent of owners rated their car Excellent; 31.0 percent said it was Good; 5.3 percent rated it Fair, and

BASED ON 1,306,208 OWNER-DRIVEN MILES

FALCON OWNERS LIKE . . .

Ease of driving, parking
Low-cost operation
Comfortable ride

DISLIKE . . .

Awkward entry, exit
Carb and brake woes
Disappointing gas mileage

POPULAR MECHANICS

OWNERS REPORT

A NATIONWIDE SURVEY



WHEEL sits high up and far back, close to your tummy in bucket-seat Squire. But owners didn't object



SNUG IN WELL, where it rides beneath plastic cover, spare tire demands you get inside to take it out

only a tiny minority of 0.9 percent turned thumbs down calling it Poor.

However, there have been a couple of changes that were reflected very strongly in the reports.

When Falcon was first marketed it had one engine (144-cubic-inch six) rated at 85 horsepower and propelling the car through a 3.10 to 1 rear-axle ratio.

The result was fuel mileage comparable with some of the smaller four-cylinder imports and notably tepid performance. So much so, in fact, that the factory changed the standard ratio to 3.50 to 1, and hustled a 170-cubic-inch (101 horsepower) version of the engine into production for the '61 model, in response to public demand which was evidenced in PM's '60 reports by the leading complaint: "Not Enough Power," 18.2 percent.

Today though, with 56 percent buying the 101-horsepower engine, these complaints are down to 3.1 percent.

Inexorable laws of physics apply here as everywhere. So when power goes up, mileage must come down and fewer owners are now satisfied with fuel economy—72.1 percent as against 89.0 for the 1960 car.

PM's test car, a well-equipped Squire with 101-horsepower engine and automatic transmission, run in cold snowy weather with over-the-road and traffic driving, turned in 17.75 miles per gallon over-all. Fuel meter results at constant speeds were as follows:

22.8 miles per gallon at 30 m.p.h.
22.1 miles per gallon at 40 m.p.h.
20.3 miles per gallon at 50 m.p.h.
16.6 miles per gallon at 60 m.p.h.
14.4 miles per gallon at 70 m.p.h.

That '60 job with automatic was a real wet noodle. It couldn't pull the lid off a stew pot in a high wind!

What we need is a multicylinder engine that would use only four cylinders in traffic for economy yet enable you to switch to six or eight when you needed power. (The French are trying it, see page 16 this issue)

Test Squire weighed about 3000 lb. with driver on board

SUMMARY OF OWNERS REPORT:

EXCELLENT

GOOD

FAIR

POOR

66.9%

30.1%

2.4%

0.6%

62.8

31.0

5.3

0.9

Satisfied with automatic economy?
About as expected.....51.4%
Better.....10.4
Not as good.....38.2

Satisfied with manual economy?
About as expected.....62.2
Better.....17.7
Not as good.....20.1

Best-liked features
Handling ease.....60.3
Economy.....37.6
Riding comfort.....22.0
Ease of parking.....21.7
Size.....16.8
Roominess.....16.5
Power, performance.....13.1
Styling.....12.0
Visibility.....11.6
Starting ease (zero weather).....9.8
Good traction in winter.....8.6

Most frequent complaints
Difficult entry/exit.....5.5
Squeaky brakes.....5.2
Carburetor.....5.2
Poor gas mileage.....4.6
13-inch tires.....4.3
Light weight.....4.3
Gas filler spout.....4.0
Squeaks and rattles.....3.7
Starter.....3.1

Had mechanical trouble?
No trouble.....72.4%
Some trouble.....24.5
Considerable trouble.....3.1

What was trouble?
Carburetor ills.....5.2
Starter.....3.1
Automatic transmission.....2.4
Brakes.....2.4

Best-liked exterior features
Simple, clean styling.....12.2
Grille.....5.5
Taillights.....4.9
Just enough brightwork.....4.6
Wood paneling (Squire).....4.0
Luggage rack (Wagons).....3.1

Least-liked exterior features
Grille.....4.6
Bumpers.....2.4
Parking lights in bumper.....2.4
Single headlights.....2.1

Best-liked interior features
Upholstery.....22.3
Comfortable seats.....11.9
Dashboard.....9.5
Bucket seats.....9.2
Heater/defroster.....5.5
Carpeting.....4.3
Manual choke.....4.0

Least-liked interior features
Glove compartment.....11.0%
Step-down floor wells.....7.6
Ash tray (too close to radio).....3.7
Lack of legroom (mostly in rear).....3.7
Carpeting.....3.1
Dashboard.....3.1

Did consider buying another compact?
Corvair.....29.1
Rambler.....15.0
Comet.....12.8

Did not consider buying an import.....79.2

Did consider buying an import.....16.5
Volkswagen.....70.4
Renault.....14.8

Falcon is only car in family.....63.6

Decision to buy Falcon based on:
Economy.....68.3
Price.....47.1
Styling.....46.8
Size.....44.3
Previous ownership.....3.4

How is dealer service?
Excellent.....51.4
Average.....37.2
Poor.....11.4

Would buy another Falcon?
Yes, would buy.....87.5
No, would not buy.....5.2
Undecided, no answer.....7.3

This kind of testimony is hard to argue with →

The 101-horsepower engine is best for all-around, one-car family use, and this mileage is quite satisfactory →

Good point, there's more to economy than just good mileage →

This is one of the big reasons import sales have leveled off →

Now let's get down to cases with the first five best-liked features as rated in their order of mention by Falcon owners.

"The car is easy to handle—I'm a new driver and am glad about this."—Rhode Island social worker.

"Ease of handling: As most of my driving is intracity, I notice this most of all."—New Mexico maintenance supervisor.

"I like the ease of handling in town and on the road."—Georgia aircraft inspector.

"It's the best handling car I ever had, and I have owned nine new ones so far."—Montana salesman.

"I use my Falcon in taxi service. It has cut my operating expense 50 percent, and driving doesn't tire me out as it does with big cars."—Tennessee taxi driver.

"I traded a '58 Fairlane for a '60 Falcon; then traded the '60 for a '61; the '61 for a '62. I spent \$5 each for upkeep on the '60 and '61 Falcons. The '62 drives and performs better all around."—Texas plant guard.

"My '62 has the 101-hp. engine. Since October, 1961, it has 15,000 miles, averaging 4000 miles per month at 21 miles per gallon driving from one farm to another."—Idaho veterinarian.

"There is no question that the best feature is economy of operation; this is my second Falcon."—New Jersey insurance man.

"I like the over-all economy: Fuel, license tags, insurance."—Oklahoma salesman.

"It uses half the gas our Chevrolet used."—New Mexico oil field worker.

"It is very economical. I save over \$200 a year on gas alone—my second Falcon."—Colorado florist.

"The Falcon is most comfortable on rough roads."—New York physician.

"I find it very comfortable (driving about 40,000 miles per year)."—Kentucky animal husbandryman.

"I like the fact that it is an economy car, and still doesn't ride like a puddle-jumper."—Maryland auto upholsterer.



ILL FITTING doors drew complaints from some owners, let snow sift into PM's Falcon Squire



A GOOD IDEA gone wrong. Spikes on pivoting seat back stick in sockets to prevent tilting but could stab seat belts

"It is about the easiest car to park I know of. Steering is free—almost like power steering—and it is fun to drive."—Illinois retail store manager.

"I like the convenience of its size when parallel parking."—Nebraska teacher.

"It's compact, yet not too small."—North Carolina license examiner.

Complaints roll in, too. Here are the first five in order of their frequency of mention.

"I also own a '62 Club Wagon. My only complaint, and a serious one, is the terrible inconvenience of entering and getting out of both front seats. The front cab should be enlarged so that a person can step in or out with ease."—New York postal supervisor.

"The door sill's in the way getting out or in."—Maine retiree.

"Getting in and out is a bit awkward."—Rhode Island clerk.

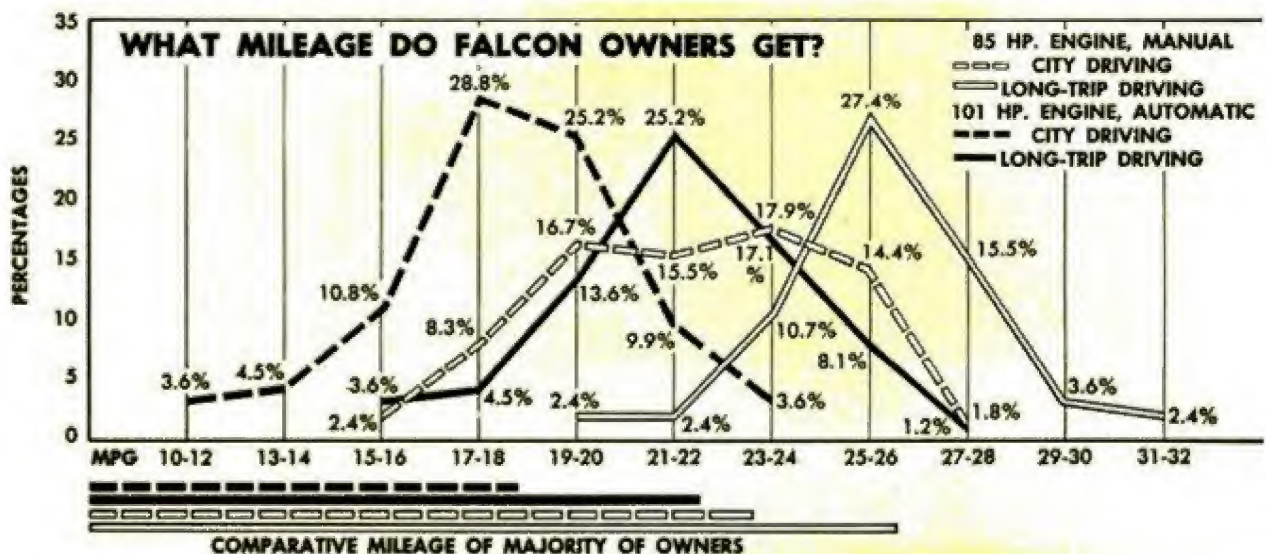
"Glazed brake lining caused squeaking brakes."—Rhode Island rubber worker.

(Continued to page 230)

← **Falcon, and some other compacts, have shown Americans that it's not only smart to be thrifty but that it can be fun, too**

← **Falcon's Club Wagon, basically a box on wheels, is one of several of this special type of vehicle which must compromise between ease of entry and added cargo capacity**

EXCLUDED are mileages of 85-hp. automatics and 101-hp. manual-shift Falcons, as few owners ordered them



Pontiac's Plush and Power Delight, But Gas Mileage Disappoints Owners

Marginal and boldface comments by Jim Whipple, PM's Auto Editor



SOFT SPRINGS (for comfort) let Pontiac heel on curve but wide track (low center of gravity) helps hug road

As a matter of fact, in February it edged out Rambler for third place in national sales →

Just take a look at a '56 Pontiac standing next to a '62 and you'll begin to understand what Bunky has done with the car →

CURRENTLY PONTIAC IS the hottest car in the medium-priced field, keeping the sales lead established during the past year over Olds, Buick, Dodge, Mercury and Chrysler.

According to a cross section of new owners, the reason for success seems to be that Pontiacs give more of what medium-price buyers are looking for, at prices equal to or lower than the competition's.

High on the list of desirable characteristics owners mentioned were the handling ease, riding comfort, power and performance and styling.

Performance was the number one factor cited by owners (68.8 percent) for buying their new Pontiacs, with styling a close second (63.7 percent). That should please S. E. Knudsen, as these were the major factors he emphasized during his five years as Pontiac's General Manager. (He recently moved over to head up Chevrolet.)

Pontiac owners seem to be a loyal group. A hard core of 45.2 percent traded another Pontiac in on their '62. All of them did not find perfection, however. Some 27.9 percent reported some mechanical troubles with their new cars. And

OWNERS REPORT

A NATIONWIDE SURVEY

BASED ON 1,427,804 OWNER-DRIVEN MILES

OWNERS LIKE . . .

All-around handling
Smooth, luxury ride
Powerful pickup

OWNERS DISLIKE . . .

Thirst for gas
Sluggish automatic shift
Sloppy, chipping paint



OWNERS PRAISE good vision but dislike glare at top of high windshield

33.2 percent of the reporting owners indicated that their fuel mileage was less than they had expected.

As a check, PM ran constant-speed tests with its fuel meter on a Catalina sedan with two-barrel carburetor and automatic transmission. Here are the results:

21.1 miles per gallon at 30 m.p.h.
17.8 miles per gallon at 40 m.p.h.
16.4 miles per gallon at 50 m.p.h.
15.1 miles per gallon at 60 m.p.h.
14.2 miles per gallon at 70 m.p.h.

Those mileages were obtained with favorable steady-speed operation, but in unfavorable winter weather.

Fuel consumption notwithstanding, Pontiac owners were generally very well pleased with their choice. Some 66.9 percent said the car was Excellent, 30.1 percent Good, just 2.1 Fair and only .6 percent labeled it Poor. And a whopping 90.3 percent said that they would buy another Pontiac.

Starting with the credit side of the ledger, here, in order of frequency of mention, are Pontiac owners' five best-liked features.

"It's very easy to handle and you don't feel like you have

*Remember, folks, this is no
← compact. PM's test car
had full power equipment,
weighed over 4000
pounds at the curb*

*This '62 Pontiac had lowest
percentage of Poor ratings
← of any PM report in
past two years. No
wonder Chief Engineer
Estes was promoted to VP*

SUMMARY OF OWNERS REPORT:

EXCELLENT	GOOD	FAIR	POOR
62.6%	31.0%	5.3%	0.9%
66.9	30.1	2.4	0.6

Satisfied with automatic economy?	
About as expected.....	50.5%
Better.....	16.3
Not as good.....	33.2
Best-liked features	
Handling ease.....	53.0
Riding comfort.....	35.1
Power, performance.....	33.9
Styling.....	29.3
Roadability.....	9.1
Visibility.....	8.7
Wide track.....	8.1
Roominess.....	8.1
Most-frequent complaints	
Poor gas mileage.....	12.3
Automatic transmission.....	5.2
Voltage regulator.....	4.2
Interior paint job.....	3.9
Rattles and squeaks.....	3.9
Had mechanical trouble?	
No trouble.....	72.1
Some trouble.....	26.4
Considerable trouble.....	1.5
What was trouble?	
Automatic transmission.....	5.2
Voltage regulator.....	4.2
Carburetor.....	2.7
Speedometer.....	2.1
Generator.....	1.8
Automatic choke.....	1.5

Best-liked exterior features?	
Grille.....	12.7%
Clean, simple styling.....	9.8
Rear-end styling.....	5.1
Roof line.....	3.6
Front-end treatment.....	3.0
Taillights.....	3.0
Absence of fins, frills.....	3.0
Lowness.....	2.7
Least-liked exterior features	
Grille.....	3.9
Taillights.....	3.0
Rear-end styling.....	2.7
Large windshield.....	2.4
Side fender gas filler.....	2.1
Best-liked interior features	
Upholstery.....	23.6
Dashboard, instrument panel.....	18.5
Comfortable seats.....	12.4
Colors.....	6.0
Headroom.....	4.2
Large trunk, storage space.....	3.9
Heater, heater controls.....	3.6
Least-liked interior features	
Ash tray.....	4.5
Transmission hump.....	3.3
Step-down floor wells.....	2.7
Indicator lights.....	2.7
Uncomfortable seats.....	2.1
Spare tire location, position.....	2.1

Did consider another car in	
Pontiac's price range?.....	48.8%
Oldsmobile.....	37.9
Buick.....	16.1
Chevrolet.....	11.2
Ford.....	8.1
Mercury.....	8.1
Chrysler.....	6.2
Thunderbird.....	2.5
Dodge.....	2.5
Cadillac.....	1.9
Is Pontiac only car in family?	
Yes, it is.....	56.1
No, it is not.....	43.9
Decision to buy Pontiac based on:	
Performance.....	68.8
Styling.....	63.7
Size.....	34.3
Previous ownership.....	10.6
Economy.....	10.3
Price, trade-in deal.....	3.9
Dealer.....	3.9
How is dealer service?	
Excellent.....	60.0
Average.....	33.2
Poor.....	6.8
Would buy another Pontiac?	
Yes, would buy.....	90.3
No, would not buy.....	3.0
Undecided, no answer.....	6.7

This is why Pontiac's a favorite with the stock-car racing boys →

If the '62 Pontiac isn't comfortable enough for you, about all you can do is stay at home on a feather bed →

Here's a realist. He knows better than to expect mini-car economy and hot performance from the same engine in a big car →

He's hit on one of the three practical reasons for plus power; the others—climbing hills, passing →

Yep, and they've even taken the Indian off the hood! →

And who knows this better than a man driving those hilly, winding roads of the Nutmeg state →

to fight the traffic—it's a real pleasure to drive."—Kentucky electrical worker.

"You can drive this car a hundred miles an hour and it handles like you were going thirty."—Minnesota foreman.

"It handles so well on the highway and in city traffic."—South Carolina insurance man.

"You hardly feel the car going over depressions or bumps in the road."—New Jersey designer.

"It has a wonderful ride."—Alabama salesman.

"Riding comfort has been vastly improved."—Nevada clergyman.

"I like its riding comfort—I am a disabled veteran and this car, with its slightly higher front seat, enables me to drive with ease."—Arkansas teacher.

"This car has been very good on the road, the best I ever owned. It is hard on gas, but makes up for it in performance."—Arizona entertainer.

"It likes to GO, GO, GO!"—Minnesota highway construction worker.

"There's power when needed to enter traffic."—Georgia executive.

"I like its slimmed-down lines, streamlined look."—Alabama teacher.

"Like the beautiful appearance—no fins, no frills, no tinsel."—Ohio realtor.

"I like the simplified styling (very little chrome, thank goodness)."—Arkansas public relations man.

"I like the way it holds the road on curves, especially in a high wind."—Arizona miner.

"Holds the road beautifully."—Connecticut manufacturer's representative.

A bed of roses can be turned into a warpath, though. Here are the complaints—the first five in order of mention.

"I'd buy another Pontiac only if they do something about poor gas mileage."—Pennsylvania foreman.

"I was told that I could expect much better mileage than on my '59. This has not proven true."—Ohio salesman.

"Gas mileage is very poor compared to the '56 Pontiac we own."—Nebraska civil engineer.



POWERFUL ENGINE looks lost under Pontiac's wide hood, but there's plenty of space for servicing or replacing such items as faulty generators and voltage regulators which caused problems for a number of the owners

"The automatic transmission is not too smooth."—Washington retiree.

"All I have against the car is that the transmission doesn't change from 1st to 2nd fast enough."—Arkansas auto trimmer.

"I have had quite a lot of trouble with the voltage regulator, and it still has not been taken care of."—South Dakota packing house worker.

"The voltage regulator stuck but my dealer repaired it at no charge."—Wisconsin salesman.

"Trim doesn't fit and the paint job is runny—both very bad."—Mississippi businessman.

"Paint chips off very easily."—Louisiana grocer.

"Paint job is not good. The roof top is dull, and rubbing it out (by the dealer) did not help much."—Illinois sales engineer.

"More rattles than usual; original assembly should be improved."—Texas airline captain.

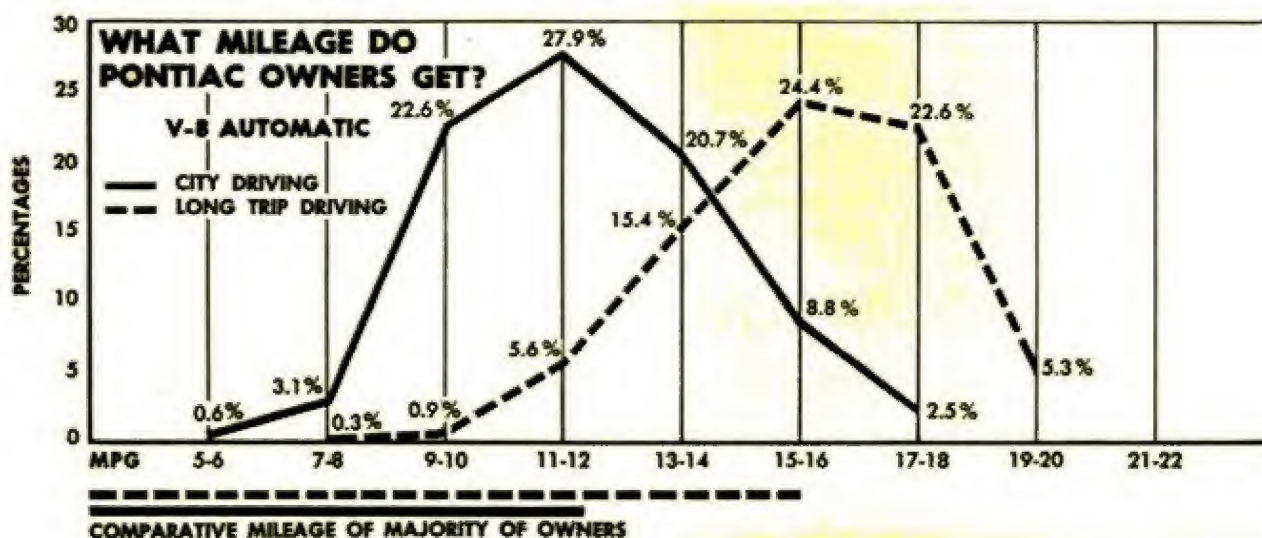
For more peans of praise, here are the best-liked features

(Continued to page 240)

← Maybe it's the way he drives it. Automatic on PM's test Catalina worked smoothly except in full throttle takeoff

← They should check these things like a chicken farmer candles eggs

← This is pretty much true of many cars' finishes when banged by carelessly opened doors. We need either guard strips or much tougher paint





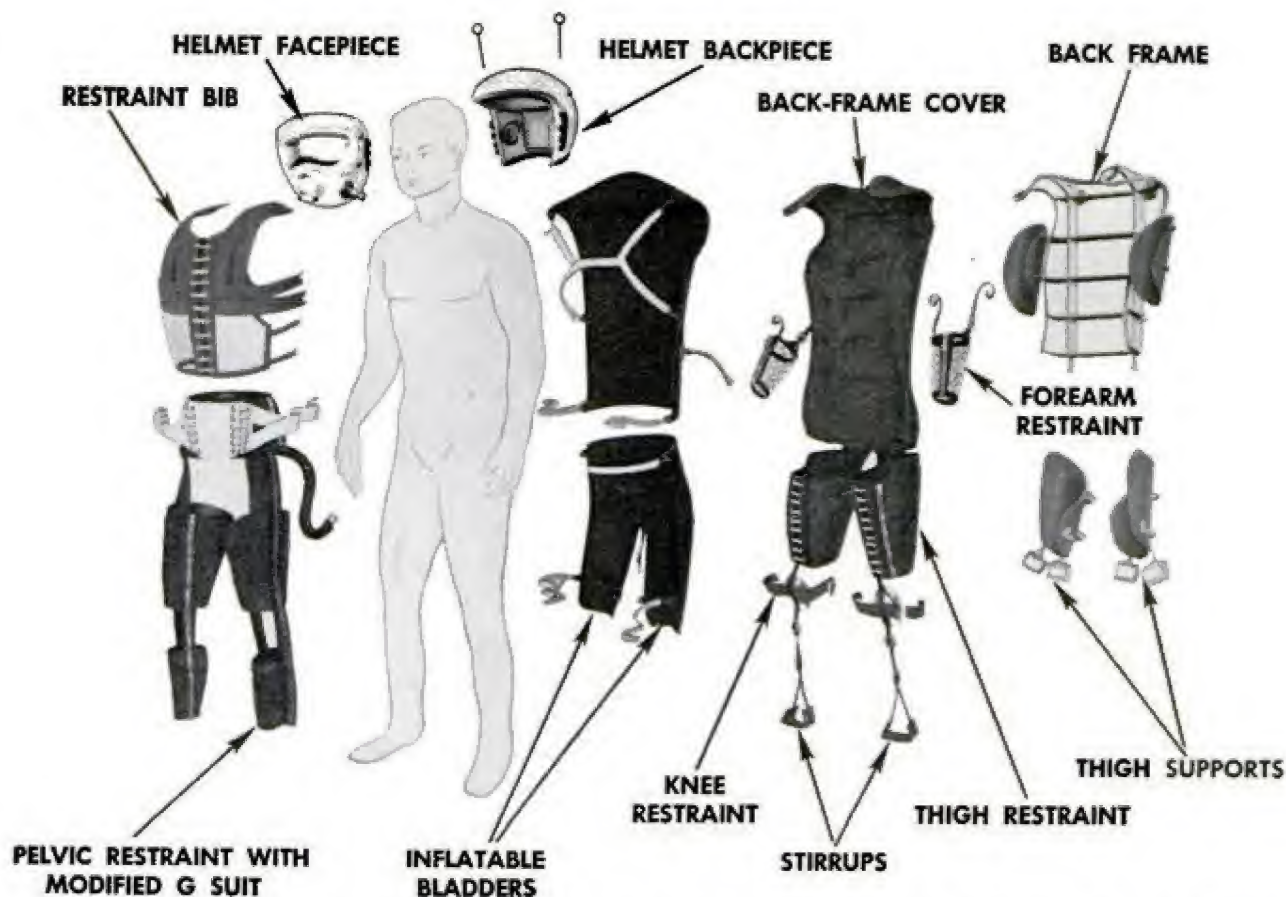
Electric Monorail

Patterned after the monorail used in Disney land, a model toy made in West Germany includes overpasses, switches, and grades of up to 30 degrees.

Many individual parts make it flexible enough to be erected in almost any arrangement. The pillars can be varied in height and, because of the small space needed, the monorail can be erected above any size model city.

Transformers of up to 16 volts can be used. The monorail is distributed in the United States by Schuco Toy Co., 1107 Broadway, New York 10, N.Y.





ASTRONAUT ALAN SHEPARD, left, models space suit made to protect pilot from effects of high gravity forces

Astronauts Get Ready-to-Wear Space Suits Right Off the Racks

WHEN THE FIRST American steps out for an evening on the moon, he may be wearing a ready-to-wear space suit rather than the custom-made jobs so much in fashion with contemporary astronauts.

Scientists at the National Aeronautics and Space Administration Center, Ames, Calif., have developed a suit which they call an "interchangeable, mobile pilot restraint system, designed for use in high sustained acceleration force fields." All parts except the face mask, which has to be custom-made, can be taken from stock.

The new space suit is mobile and has a bladder back support which eliminates the need for the individually contoured couch of the Mercury astronaut. Back frame of the suit is built of aluminum plate. The pilot wears a bladder between the nylon-covered frame and himself.

Inflatable bladders appear elsewhere in the suit; for example, one is used to support the buttocks. A series of stays is incorporated over the frontal area of the girdle, and a broad belt there serves as a safety belt.

FACE MASK, shaped by making a plaster cast impression of the pilot's face, provides a sealed compartment



KNIGHTS OF THE RIVER SEINE

1 EN GARDE! At signal, boats rush forward, lancers lower their poles

2 A L'ATTAQUE! As boats close in, combatants screw their courage to sticking place and brace themselves for teeth-rattling crash



FRACTURED FRENCH may have originated on the River Seine, just outside Paris. There some intrepid Gauls have revived the ancient, and bone-breaking, sport of *Jouette Layonnaise*—water jousting.

Based on the equally ancient and dangerous sport of jousting from horseback, the lancers mount the sterns of long boats powered by eight broad-shouldered oarsmen. On a signal, the boats—separated by 200 feet—start toward one another from a dead stop. The boat that accelerates the most has a better chance of retaining its lancer. The lancers, armed only with wooden shields and 12-foot poles, brace themselves for the crash. Sort of a head-on drag race.

The secret is to get a good solid blow at the opponent's shield, with the full force of the braced body and moving boat behind it. It's not hard to pick the winner. The loser is in the water.

You have to admit, it's different. And, as they say in France, *vive la difference!*



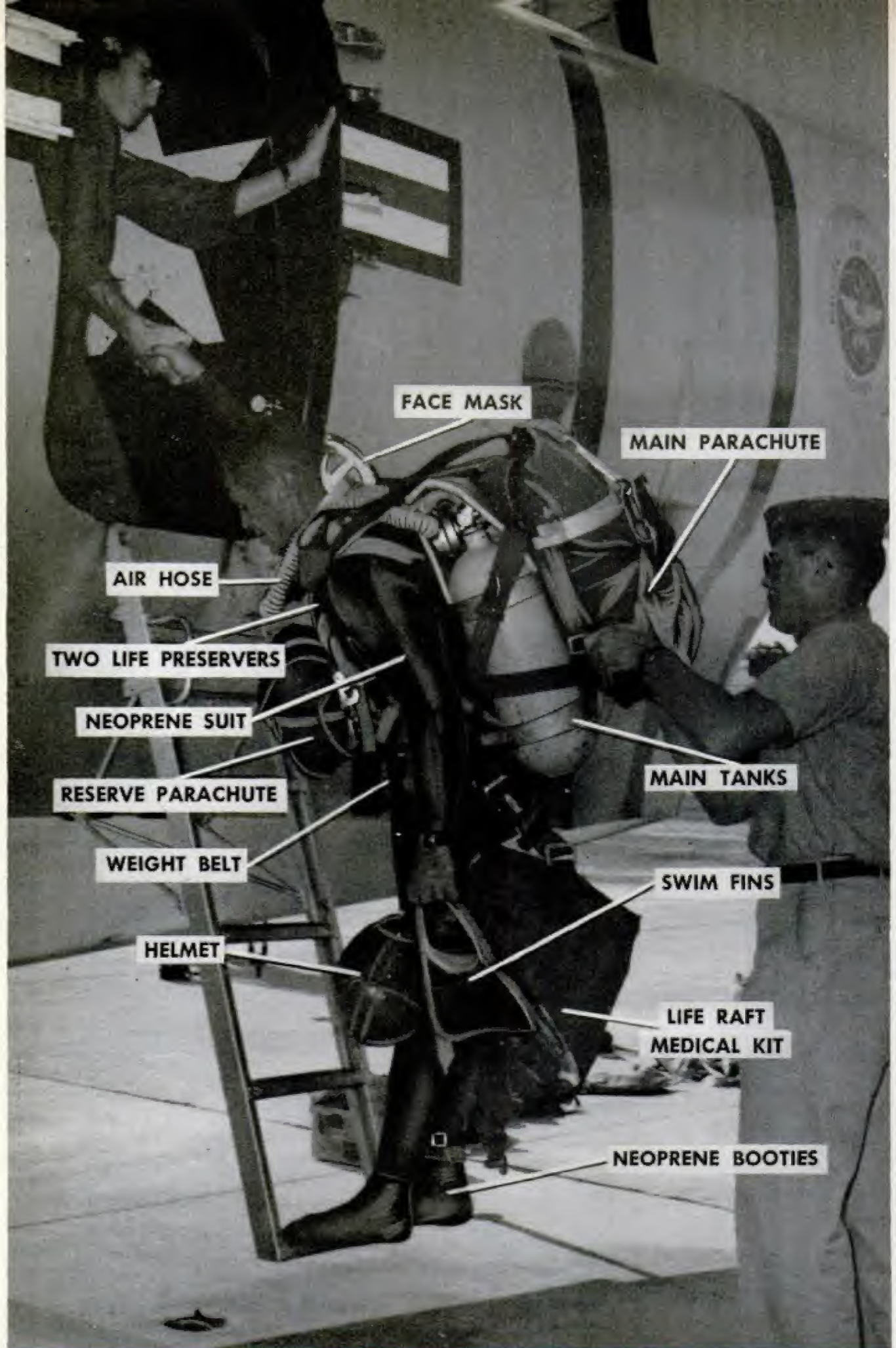


3 **TOUCHE!** And double touché! Each lancer hits his target exactement



4 **SACREBLEU!** One loses footing, match and dignity, and receives loser's reward—a bath. Dry winner will be wetted down at local bistro





JUMPING FROG, loaded down with 180 pounds of gear, is equipped to parachute into ocean, swim underwater

The Celebrated Jumping Frogs

... parachute from planes in scuba gear to save satellites and astronauts. They are part of the Air Rescue Service which has made some of the most dramatic rescues in the annals of disaster

By
Kevin V. Brown



IN THE BRILLIANT glare of publicity surrounding the on-again-off-again attempt to orbit a man around the earth early this year, some of the light spilled over onto a new group of rescue artists, who have developed new techniques in the old craft of saving people.

Combining the skills of underwater swimmers and



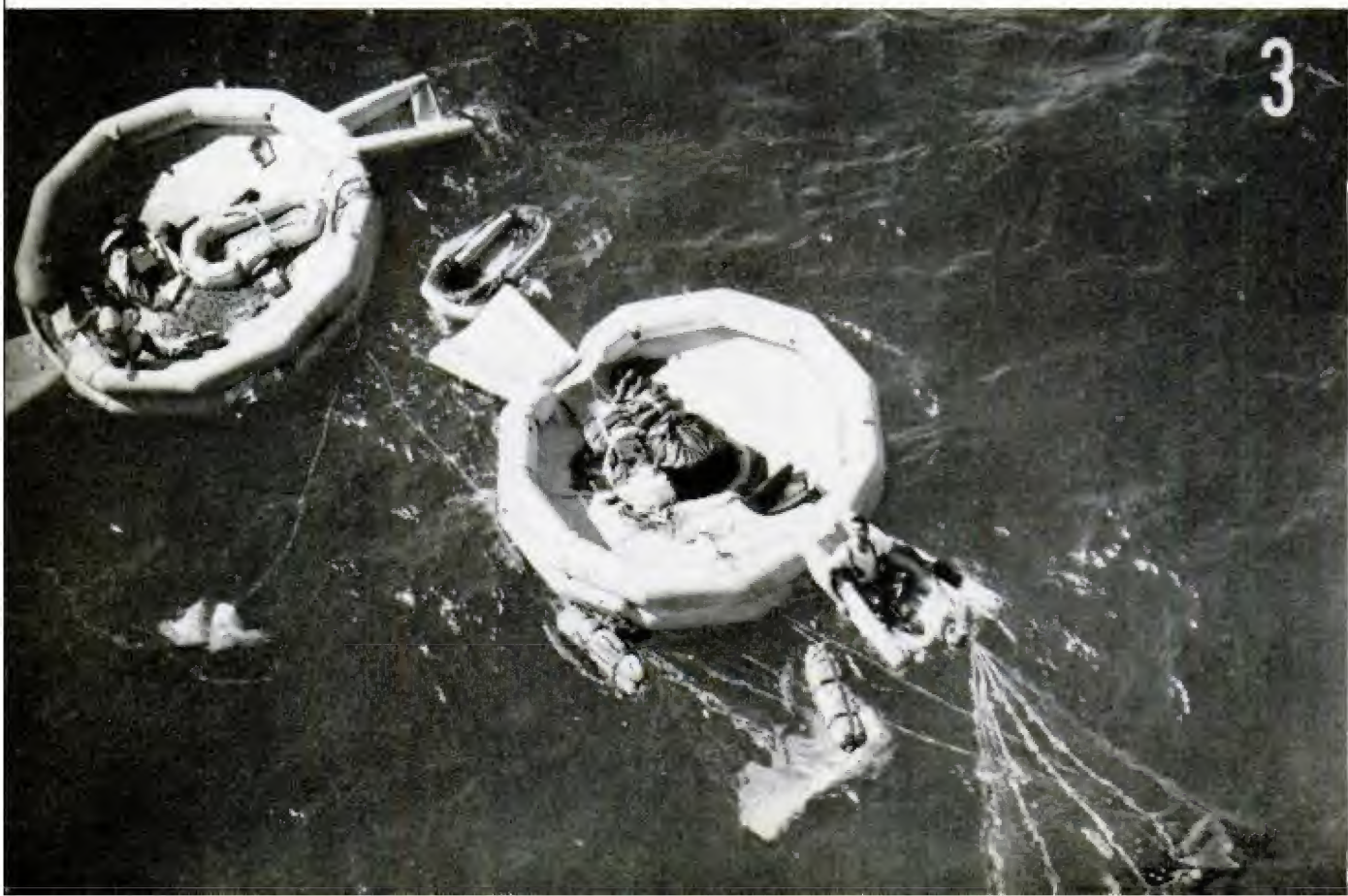
PARARESCUE TEAM, after securing spacecraft, awaits pickup



PARARESCUEMAN deploys life raft on dropline as he floats down to save Discoverer satellite

ALONGSIDE SATELLITE, frogman awaits drop of large life raft. These pictures were shot during actual recovery

DISCOVERER XXIX is now secure (in black tarpaulin) aboard life raft. Rescue was made last year in Pacific





SPACECRAFT RECOVERY is similar. Two-man team attaches floatation device to capsule before inflating it

paratroopers, these flying frogmen were assigned the emergency task of recovering the astronaut if he landed anywhere outside the planned impact areas. The system they have perfected is to parachute near a floating spacecraft, swim to it underwater, secure it to a huge liferaft and, if necessary, render first aid to the occupant.

The idea of putting parachutes on frogmen and flying them to the scene of a rescue is the latest development in techniques used by the U. S. Air Force's much-decorated Air Rescue Service. And these pararescuemen, as the airborne scuba divers are called, are probably the most renowned jumping frogs since Mark Twain's fictional friend failed to get off the ground some years ago in his story of "The Celebrated Jumping Frog of Calaveras County."

Pararescuemen are, in fact, all things to all men in trouble—precision parachutists, gifted underwater swimmers, skilled medics and experts in survival.

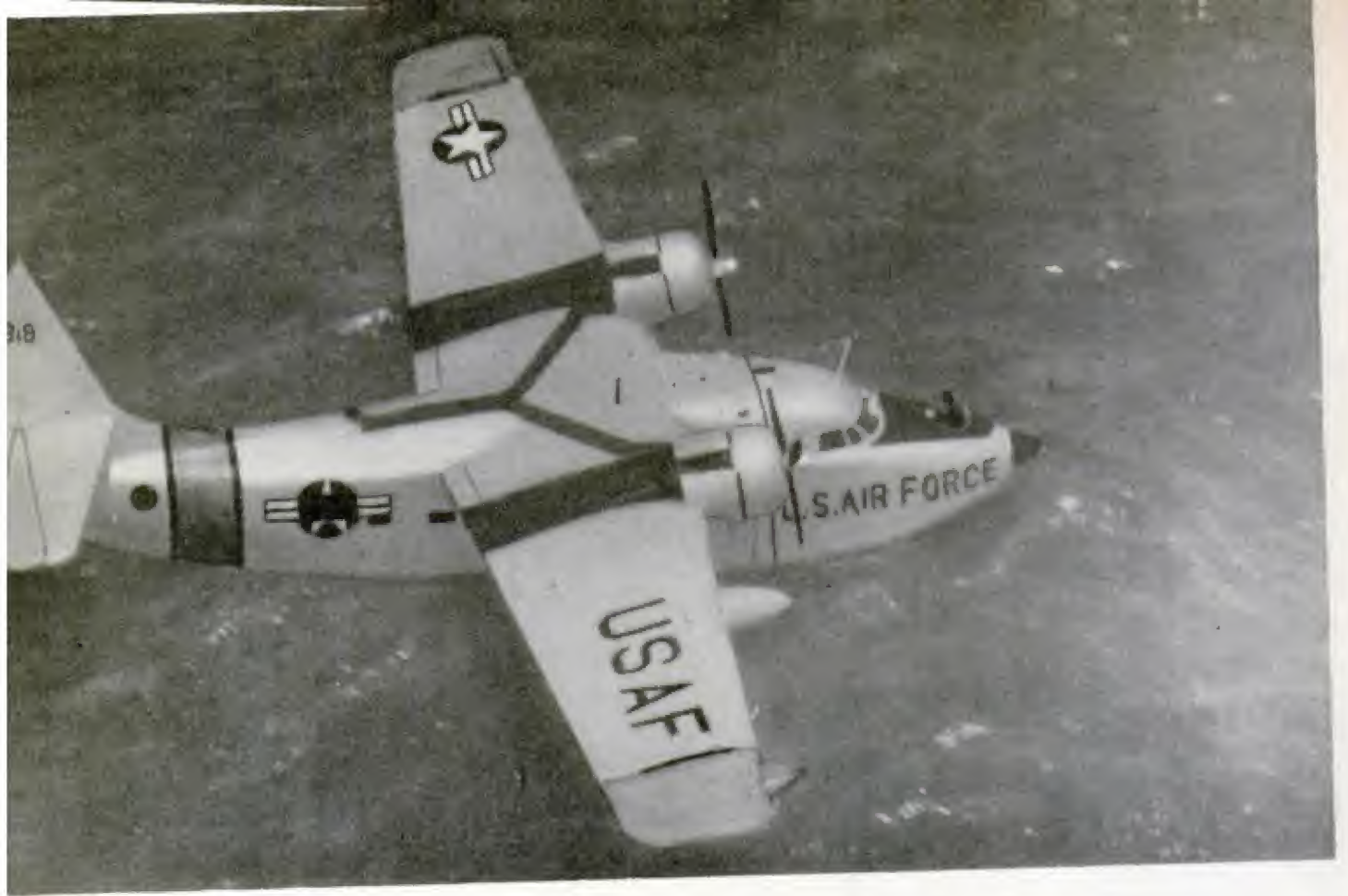
Equipped for action, a pararescueman can easily double his normal weight. Ready to jump, he carries as much as 180 pounds of gear. Over his rubber scuba suit, helmet

and boots he wears: Oxygen equipment, including two tanks, hose and face mask; two parachutes, one for emergency use in case the first fails; two life preservers to help him float, and 20 pounds of weights to help him sink (for underwater swimming); swim fins and a surface snorkel; a life raft; a diver's knife; a medical kit; and a tool belt, which includes all the instruments he needs to secure a satellite or spacecraft.

Pararescuemen have made the transition from parachutist to frogman in as little as 90 seconds. In training, they have jumped from planes and secured simulated spacecraft in less than five minutes.

The pararescuemen who specialize in recovering satellites operate out of Hickam Air Force Base, Hawaii. At this writing, fourteen Discoverer satellites have been recovered after orbiting the earth, sometimes by mid-air snatches by Air Force planes and sometimes by jumping the frogmen. If the snatch fails, the frogs jump.

The flying frogmen who are trained to recover Mercury astronauts and their spacecraft have done most of their training in the Gulf of Mexico. They were, however,





DRAMATIC RESCUE of survivors of airliner shot down by Chinese Reds is made by Air Rescue plane



FACES OF SURVIVORS of another airliner ditched at sea tell story of another dramatic rescue by ARS

←**ARS HELICOPTER** hoists to safety crewman from foundering ship off coast of Okinawa. Other crewmen cling to railings. Pounding surf drove ship onto reef and forced open her watertight door, flooding her

deployed in the Atlantic Ocean for the suborbital flights of both Lt. Comdr. Alan Shepard and Capt. Virgil Grissom, as well as for the full-orbital attempt by Col. Glenn.

Their techniques for recovering both satellites and spacecraft are similar.

Here is the sequence for spacecraft:

When the spacecraft is located, a smoke bomb is dropped to check wind direction, then the aircraft (usually a Douglas SC-54 *Rescuemaster*) flies into the wind at an altitude of about 1200 feet. When it is over the spacecraft, it drops a spotter chute which always drifts downwind. The chute is weighted to approximate the weight of a fully equipped pararescueman.

On the next pass, also upwind, the crew clocks the time it takes the airplane to fly from the chute to the spacecraft and, when the plane has flown the same number of seconds on the opposite side of the capsule, two frogmen jump.

Using this system, they have landed as close as 10 feet from the capsule.

When his main chute opens, each pararescueman discards his spare chute while still airborne and deploys his small rescue raft and first-aid kit at the end of 10-foot droplines. The raft automatically inflates on the way down. Just as his feet touch the water, the pararescueman releases his

chute which billows away in the wind, and he is now a full-fledged frogman.

Next, the two-man team joins up, orients itself on the spacecraft and swims to it, dragging their rafts behind them. (The rafts, kept only for emergencies, are seldom used. Or as one Air Rescue wag put it, "They're for frogmen who are afraid of the water.") If the sea is calm, they swim on the surface. If not, they can make better time underwater. Since they have been breathing oxygen from the time they jump, the transition is no problem.

Meanwhile, their aircraft has circled the scene and, when the two of them have reached the capsule, the plane makes a low pass and free drops (without parachute) a special floatation device for the capsule.

If the astronaut is believed to be in serious need of medical attention, the plane will also drop an MA-1 kit, a more sophisticated medical first-aid kit which includes two large-size life rafts connected by a long, floating cable. Dropped upwind of the capsule, the MA-1 kit—the two rafts with the cable between them—floats down to the capsule and, like a South American cowboy's *bola*, wraps itself around the capsule where the pararescuemen can get at it.

When the special floatation device hits

(Continued to page 234)



PREFAB FIREPLACE— OF BRICK

INSTALLING A FIREPLACE, either in a new home or as an add-on to a finished house, is greatly simplified with a new prefabricated-fireplace unit designed to be installed in a single day. Basic unit in the prefab kit is a heavy steel form which provides the smoke dome, downdraft shelf, damper, throat and firebox in the proper positions and proportions to insure efficient, smoke-free operation. Slip-fitting intermediate chimney sections fit on the form and connect to a prefabricated exterior housing that looks like a brick chimney.

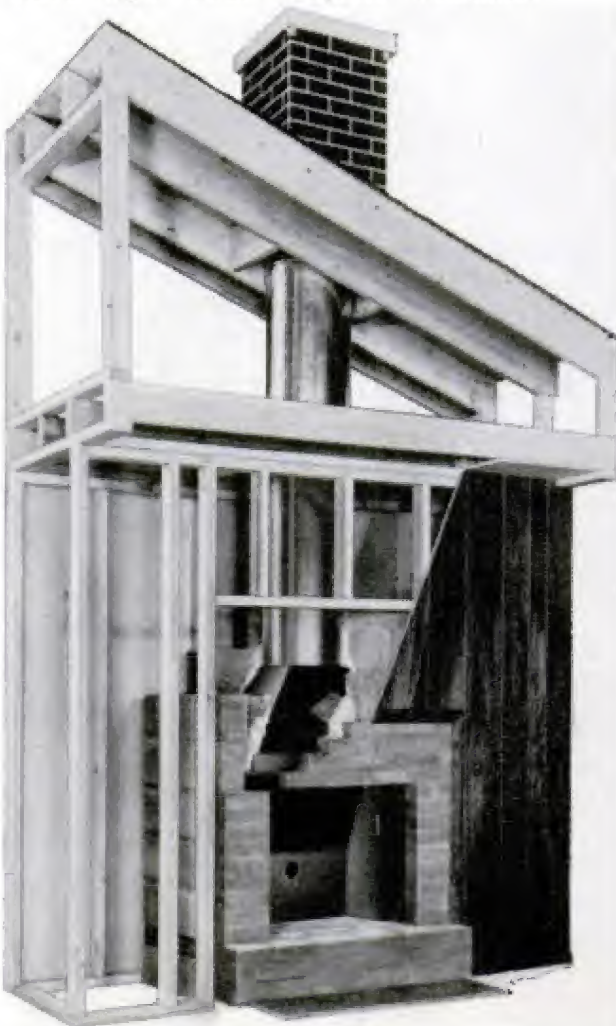
Installation is simple (see cutaway at right). After pouring an eight-inch concrete pad (over suitable foundation unless the fireplace will rest on a slab), the steel form is placed on a firebrick hearth and surrounded with concrete block on three sides. Face brick is laid on the exposed face. The intermediate sections are fitted together and extended through a hole cut in the roof, then connected with the exterior housing through a prefabricated chimney flashing. The entire job can be finished in as little as 10 man-hours on a one-story home. Forms are available for either front-opening or corner fireplaces; the corner style is shown.

Cost of this do-it-yourself installation was \$273 for the prefab unit, five feet of chimney sections and a six-foot chimney housing. Materials for installation—masonry and lumber—cost another \$78, for a total cost of \$351. The cost on simpler fireplaces can be as low as \$235.

The unit shown is the Heatilator, 500 Series, made by Vega Industries, Inc., Syracuse 5, N. Y.



LIVING ROOM before, above left, and after, above right, corner fireplace installation





FINISHED FIREPLACE, with masonry and paneling concealing prefab, passes easily for original equipment
WITH FOUNDATION laid through basement, base form goes in place, below left. Right, frame for paneling





SILENCING SYSTEM installed on T-Bird (top) has no conventional mufflers. Cutaway above shows resonators

Exhaust Pipe "Hot Dogs" Replace Muffler

LOOKING LIKE king-sized hot dogs, hollow resonators, located inside the exhaust pipe itself, may well replace conventional tube-and-baffle mufflers on one or more 1963 cars.

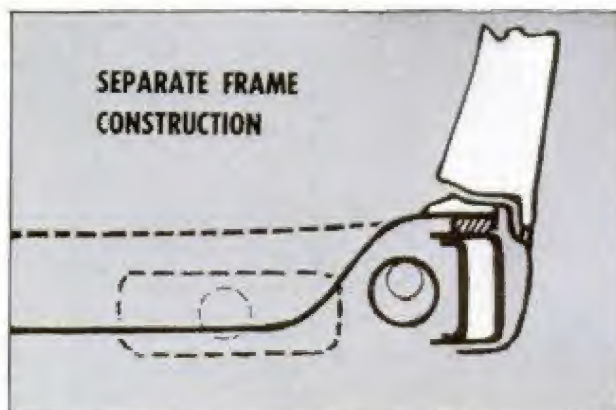
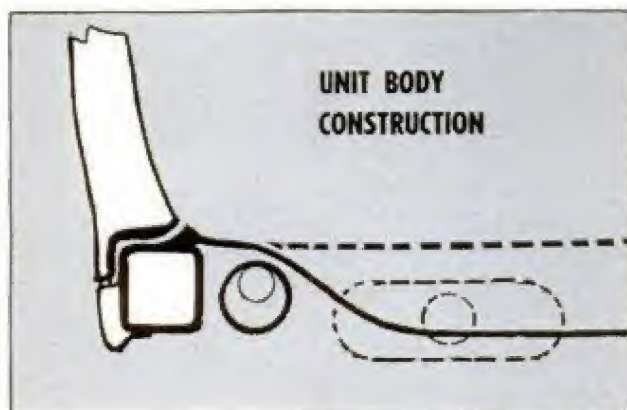
The new silencing system, called Arvi-Node, consists of an oversized exhaust pipe 2¼ inches in diameter containing 1½-inch-diameter resonators welded to the top. Most such systems require five or six resonators of varying lengths.

Here's how the systems work: As sound

waves reach the resonators, (which have small openings in one end), the resonators are in turn activated and create sound waves of their own which pulsate back against the original sound pressures, causing them to diminish or fade out completely.

The novel "hot dog" system is said to last 2½ times longer than a conventional muffler, because the bottom of the exhaust pipe is clear throughout its length. This permits a direct flow of hot gases, reducing the accumulation of dirt and corrosive liquids.

COMPACT PIPES containing resonators, shown next to frame members in the cross sections below, will enable designers of future cars to lower floors due to elimination of bulky mufflers (dotted lines)



Don't Let the Cries of Doomsday Panic You...

Despite some muddy emotionalism over the value of shelters, research studies show that life unquestionably would go on after the bomb. Here are the facts and figures

By Richard F. Dempewolff

IT WAS TYPICAL fall weather on the day that 263 nuclear weapons struck 224 targets inside the United States. We had been blasted with 1446 megatons of explosive. Before the day was out, an additional 2500 megatons would soil the heavens over U. S. overseas bases and in retaliation against the enemy homeland.

The enemy had hit us with the most destructive punch he could throw—and that's just the way we had planned it.

For this was a theoretical attack, plotted by scientific and military experts to determine the extent of death and destruction which would result from a nuclear war. All weapons had hydrogen warheads. In power they ranged up to 10 megatons (huge bombs like Russia's threatened 50 to 100-megaton monsters would militarily be wasteful and inefficient). All were detonated with the fireball kissing the earth's surface to suck up maximum material, to produce maximum destruction around point zero and maximum fallout at vast distances. Actual weather patterns were used to determine long-term fallout effects.

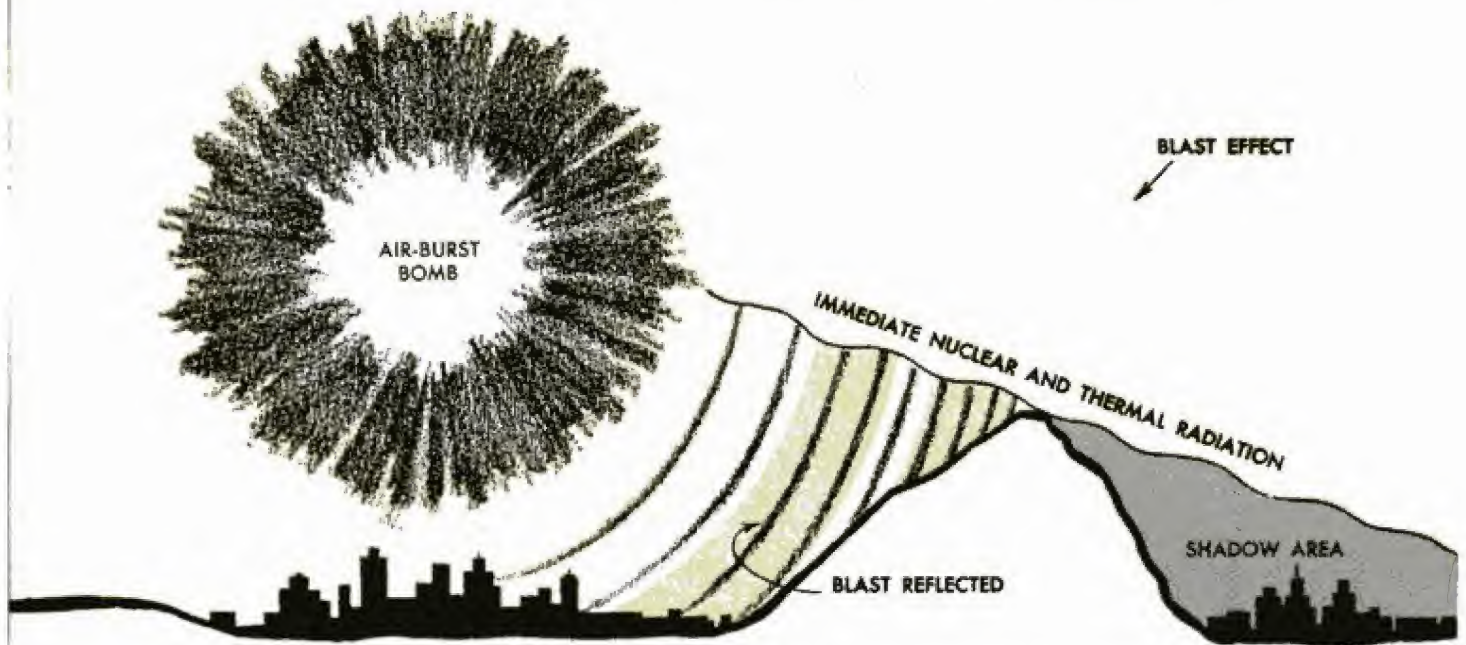
And what were the results of this theoretical but nonetheless horrifying attack? That 50 million *unsheltered* Americans would die. But the U. S. Congressional subcommittee on radiation, in reporting on these findings, put the matter this way:

"The most significant finding," said they, "was that civil defense preparedness could reduce the casualties from approximately 30 percent of the population to about three percent."

Even if this were to bring the terror within the bounds of comprehension, though, it still does not answer the nagging questions about what happens after the attack is over. Thousands of Americans—debating in their own minds the value of shelters, have wondered: What kind of hunger- and horror-ridden world would we find after such an attack? What would we do for food, water and shelter? How would we support ourselves and families? Who'd care for the sick and dying?

What would life be like? Would survival be worthwhile?

Shadows hidden from the killing



To find answers, *Popular Mechanics* sent me on a tour of government agencies involved in a whole new flurry of post-attack planning.

Here's what I found.

Even after a devastating assault as bad or worse than the one you just read about, some 96 percent of our land area would be virtually unchanged! If you live anywhere in that broad territory and, after two weeks or so in a shelter Conelrad advised safe radiation levels, you would emerge to find your town looking about the same as ever. Some things would be different. No birds would be singing. Evergreen trees and shrubs—highly sensitive to radiation—might be brown or browning. Some small vegetation may have wilted. There probably would be no animals in evidence. But it would be far from the silent world of hot rubble often conjured up. In most places there would be considerable human activity.

Make no mistake; the picture wouldn't be all that pretty. There's the other four percent of the country. It would total 144,600 square miles of wreckage.

"We are dealing with twin national problems," explained an official at the President's Office of Emergency Planning. "There are the scattered areas of heavy damage filled with refugee and sick, mountains of rubble and no housing. This is a rebuilding job. A survivor here, when he comes out, better forget everything and run. Little immediate help can be rendered for these areas. They will be awful.

"But on the peripheries of blast areas and beyond are vast undamaged rural

lands, thousands of villages, towns and cities, intact except for temporary fallout. These areas can and must function to carry on the nation's work. We start with them."

That's nice to hear. But who's going to start what?

Chances are that for the first few weeks you'll shift for yourself. Neighbors will band together to prevent looting and help each other. Volunteer organizations will take over any emergency situation until State and Federal plans get under way. Will there be any food available? Food and farmers, according to Department of Agricultural spokesmen, will be in good shape.

Why won't food be radioactive? Officials point out that an astounding number of people have a grossly mistaken idea about fallout. There's nothing spooky about it. It is a substance like dust or dirt. It falls to Earth like dust. It can be washed away or swept up and removed, like dust. Unlike ordinary dust, it gives off X rays that can damage living tissue, which is why people must hide from it behind dense material that stops the rays. But fallout radiation decays fast. In two days it is less than one percent of what it was at one hour.

One thing many people don't realize is that in most places they will be able to leave their shelters for short periods—to replenish food stocks or dispose of wastes—within a day or two of any attack. The point is that the rays are not injurious to inanimate material, nor can they contaminate anything. The dust is the contaminant. If it gets into food and if you eat the radiating dust particles, *you* will be irradiated.

In even the heaviest fallout areas, many

sun can provide safety

ENTIRE COMMUNITIES could survive a bomb blast unscathed if they sit in deep valleys, behind hills, or if they are blocked from thermal and blast radiation by massive brick and concrete buildings. The people would have to protect themselves against fallout. The point is illustrated by this loaded propane tank which survived a multikiloton blast less than a mile from ground zero in a Nevada test. It was shielded by bulk of damaged house



packaged foods in markets will be safe to eat immediately after an attack. All they'll need is a washing off (on outside of package). Other things, such as vegetables, can be scrubbed clean and consumed. Water from covered wells will be useable. So will surface water, once particles have settled out—probably in a month, studies from Emergency Planning show. (Geiger counter check required.)

Plans are in the works for special government-directed teams that will redistribute ready foodstocks so everyone will have enough. Measures are going before Congress for moving grain stockpiles to fallout-protected silos, located just beyond blast diameters around probable target cities that would become obvious distress areas.

What about replenishing food stockpiles? Studies show the average farmer faring better than anyone else. Most of our farm and range land lies in what planners call "white areas," where fallout in any attack pattern useful to the enemy would seldom exceed $\frac{1}{10}$ roentgen per hour.

"Many farmers," says the Department of Agriculture, "have already provided some fallout protection for their livestock. A barn with slate roof that could be hosed down would be adequate. Most farmers, except those downwind of a detonation, could be feeding and milking within a day of attack under fair to good conditions.

"Truck gardeners will have no more trouble with fresh vegetables than they do in handling them after use of poison sprays. They'll have to be washed clean. Some young plants and legumes (peas and beans) will have to be monitored since they like

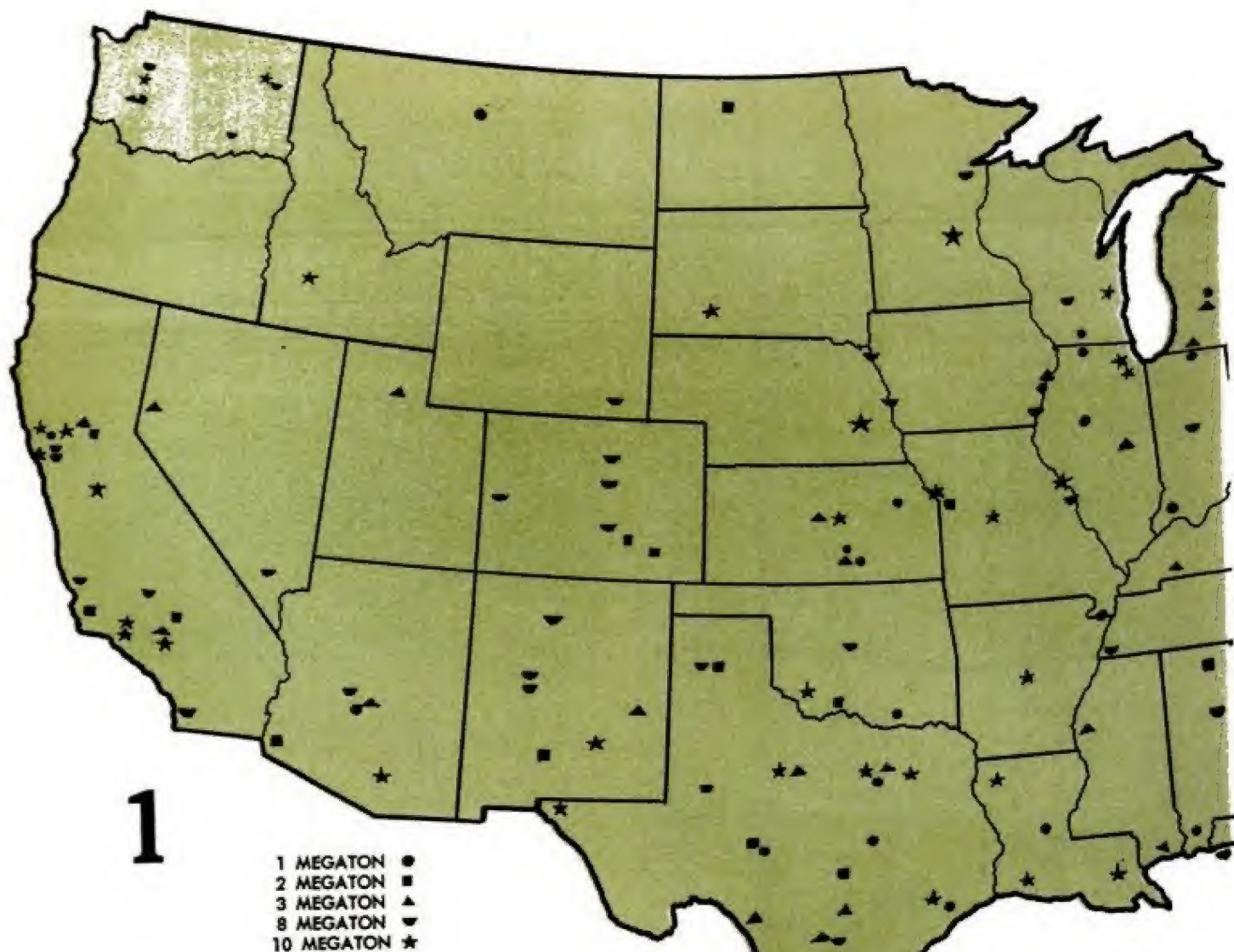
calcium, and tend to pick up from the soil its insidious fallout cousins, strontium 90 and cesium 137."

Long-term radiation effects on foodstuff aren't too accurately known, so a number of conclusive experiments are now going on to find out. One thing the physicists have learned, however, is that seafood rejects radioactive strontium 90 and cesium 137—longlived and serious health hazards that are by-products of nuclear fission—and sea life is highly protected by its element from other fallout products. So fish diets would undoubtedly find a place on far more menus following any nuclear attack.

Department of Agriculture scientists say fallout radioactivity can be removed from fields by scraping away the top few inches of soil. Further, they've found heavily limed fields pass to crops less strontium 90 than do unlimed.

Other reports, covering long-range effects, and developments to minimize effects of radiation are emerging from other labs. Two biologists from New Mexico Highlands University, for example, have found that nuclear blasts at the Nevada test site (where more atmospheric detonations of nuclear weapons have been made than at any other location in the free world) although immediately destructive to plants, appear to have little effect on the return of hardy, pioneer-type vegetation. They found that plants within a range of one-half mile were eradicated by heat and shock of blast, but with the next growing period, the plants were springing up within the central

For radiation patterns, see next page →
(Story [continued on page 222](#))



2 Fallout condition after one hour

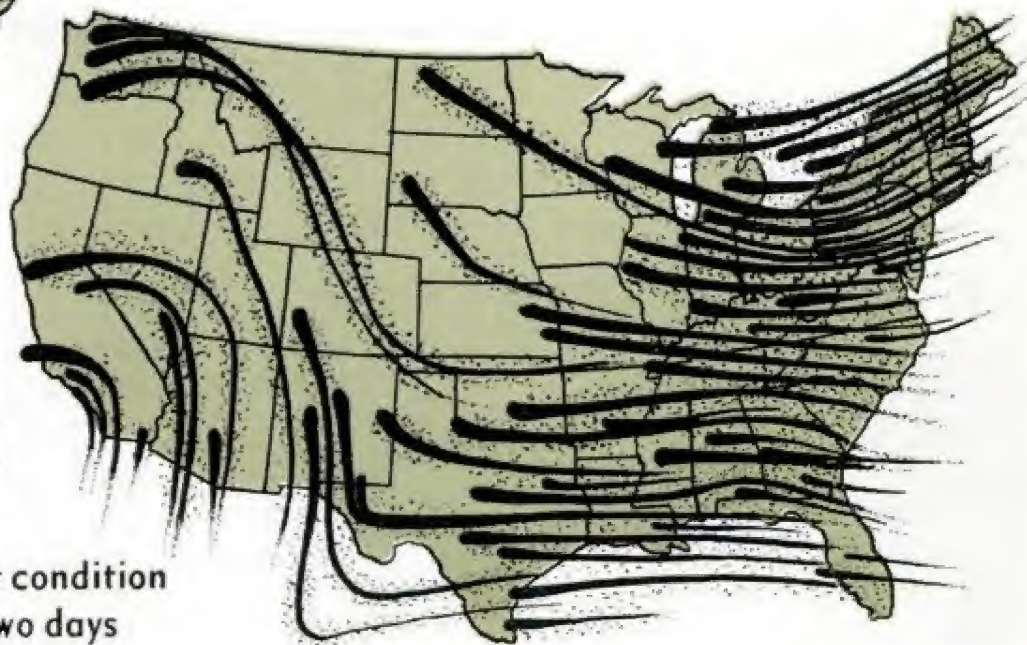


Pattern of Fallout in a Hypothetical War In Which 1400 Megatons Hit U. S. in One Day

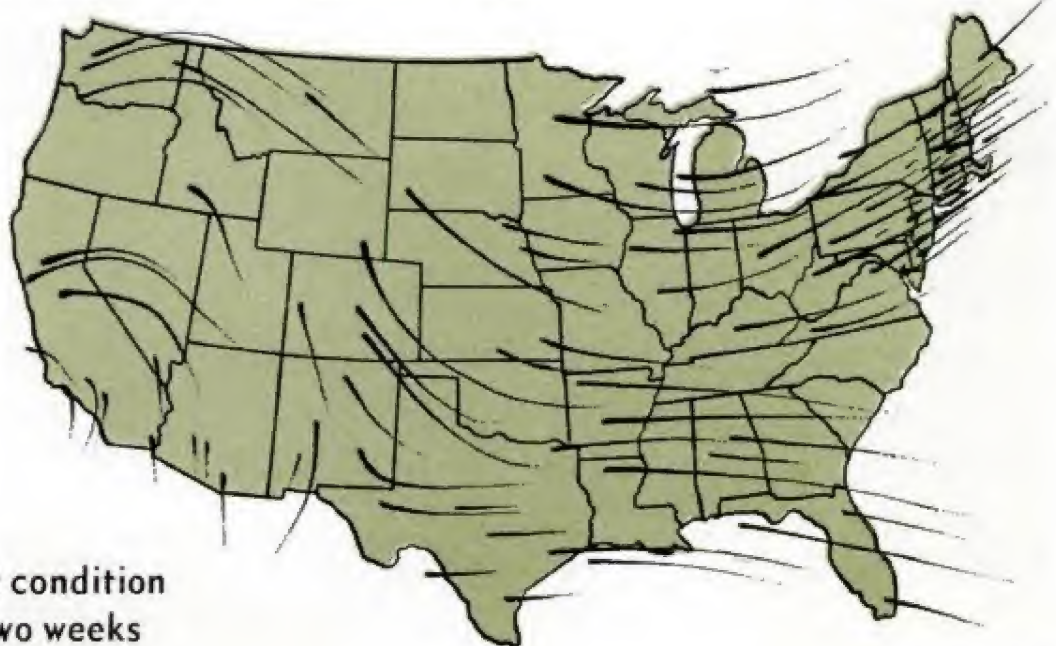
NUCLEAR RADIATION is measured in roentgens or rems (roentgen-equivalent-mammal). One rem effects living tissue the same degree as does one roentgen of X ray. Two hundred rem in one day will cause nausea in half of any group; few would die. All would be sick, half would die within 30 days after 450 rem. A 600-rem dose would kill most of any exposed in hours. In the hypothetical attack described, instant radiation up to 700 rem two miles from each 10-megaton burst, and 1.5 miles from 1-megaton bursts were recorded. One hour after attack some 10 percent of country lay under fallout drizzle exceeding 3000 roentgens per hour in some places. In seven hours, some radioactive cloud patterns from single blasts stretched 150 miles downwind, emitting 450 roentgens per hour at edges, 3000 at the core. After two days, half of nation was blanketed but due to natural decay, intensities were down to maximums of 30 roentgens per hour. Two weeks after attack, only a few pockets exceeding 1/10 roentgen per hour were left.



3 Fallout condition
after two days



4 Fallout condition
after two weeks



I Fished the Finest Spot in North America

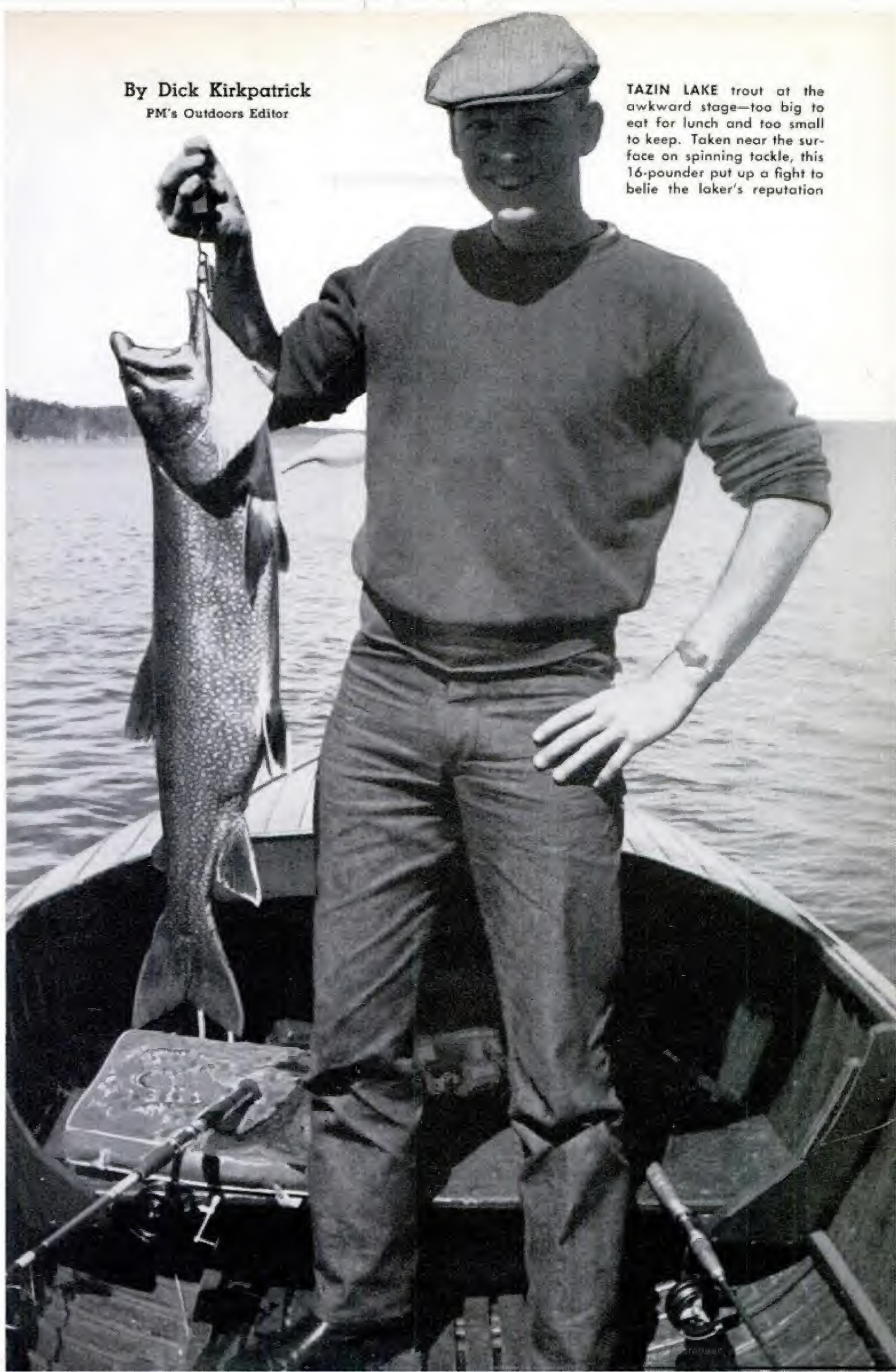
IT WAS A DREAM ASSIGNMENT. The boss asked, "What's the best fishing spot in North America?" While I mulled over the legendary waters from Mexico to Alaska, he went on, "When you've made up your mind, go there and prove it." Any fisherman would have jumped at the chance, and I did. Three days later I wished I had never been asked.

What makes a good fishing spot? Lots of fish? Big fish? Good action every day, all season? A variety of species? Comfortable accommodations? Easy access? There are a dozen factors to be considered, and your ideas might not agree with your neighbor's. Add to

**WORLD'S FINEST
AIRPORT WAITING ROOM**

By Dick Kirkpatrick
PM's Outdoors Editor

TAZIN LAKE trout at the awkward stage—too big to eat for lunch and too small to keep. Taken near the surface on spinning tackle, this 16-pounder put up a fight to belie the laker's reputation



Keepers!

that the fact that, to mean much to a nationwide audience, the location should be a freshwater spot centrally-enough located to be fairly easy to reach from anywhere in the United States.

After considerable research, the pattern became apparent. For really big fish, I had to find lake trout or muskies. Lakers are a lot more reliable when you're fishing in a limited time—as most of us must—and they usually cohabit with other good sporting species such as northern pike, other trout and walleyes. And to get away from the beaten path, the over-fished waters I had to go north—a long way north—but still stay in an area that anyone could reach.

As I interviewed fishermen, sportswriters, bush pilots and resort people, a new name began to crop up—Tazin Lake. Several people had heard of it, but nobody knew for sure where it was. It was a newly opened lake. Only 26 men had fished it the year before, and two had put lake trout in the top ten of a national fishing contest; one 44½ and one 41⅓ pounds. Two for 26 is an unheard-of average.

Tazin Lake turned out to be almost hidden in the extreme northwest corner of Saskatchewan, north of Lake Athabaska and south of Great Slave Lake, on the Slave-Mackenzie watershed. That country is famous for monstrous lakers—Athabaska yielded a 101-pounder to a commercial fisherman last year—but is neither too far north for northern pike and walleyes, nor too far south for greyling. Despite its remote location and unfished reputation, the lake turned out to be only 20 miles or so from Uranium City, Sask., a bustling mining town named for its main industry and a regular stop on a scheduled airline. That fulfilled the access requirement.

Even Rejects are Impressive



A KEEPER, this trout just made the 25-pound mark to qualify for the ice house and a trip home in one piece

SIGHT TO BRING TEARS to the eyes of a prairie fisherman—guide Chummy Heron puts an 18-pounder over the side to grow up. After the initial shock the visiting fisherman becomes accustomed to this sort of thing; some even manage to smile as he swims away



HAPPY FISHERMAN with a pair. Twenty-pounder is a mite light, but could you have watched it go back in?



THREE from the ice house. Vince Pullar shows off three trout in the 30-pound class on their way out to taxidermists. This batch of six (three more in truck) stopped traffic even in Uranium City

Getting up there isn't as hard as it looks; there are two alternatives. At least one Canadian air service, Parsons Airways, Ltd., of Kenora, Ont., makes weekly trips to Tazin Lake, flying in fishermen on a seven-day package deal. Or you can make your arrangements separately with Tazin Lake Lodge and fly in commercially to Uranium City. The hop to the lake is no more trouble than grabbing a taxi across town; a local air service covers the area nicely with several float planes.

A lot more trouble than actually making the trip was packing for it, and keeping my gear somewhere near the 40-pound weight limit, which pertains whether you fly commercial or charter. (Canadian airlines, however, usually allow 44 pounds.)

By using a salmon bag instead of a tackle box, making tackle do double duty, carrying rods in a cloth bag instead of a metal one, and keeping accessory gear to a minimum, I managed to leave home right on the nose at 40 pounds. I made light clothing do heavy duty by combining down-insulated shirt and pants with a nylon-and-rubber two-piece rain suit in place of heavy foul-weather gear. A couple of pairs of fishing slacks and a couple of warm shirts filled out the necessary wardrobe nicely. They don't dress for dinner at Tazin Lake Lodge.

I flew from Chicago to Uranium City by way of Edmonton, Alberta, a two-day trip if your reservations work out. At the McMurray Air Service base, waiting for the hop into Tazin Lake, I made one discovery



CANADA'S most gracious custom, the shore lunch. Fishermen watch while guides cook fillets on an island

—the world's finest airline waiting room. The small lake that serves as a landing field was alive with northerns, and they were as hungry at the end of the air service dock as they were anywhere. The natives, spoiled on Tazin and Athabaska lakers, scoff at the "snakes," but they beat sitting around any air terminal I've seen.

As I arrived at the airline office, I met a party of 10 fishermen on their way out after a week at Tazin Lake. The fishing had been great, they reported; six of them were taking out lakers over 30 pounds for mounting. Things were looking up.

A sudden batch of wind kept us from flying to Tazin Lake that afternoon, but next morning we made the short hop over the rocky hills to Tazin Lake Lodge, which sits on an island alone in the middle of the 25-by-10-mile lake. Flying in over the lake, you understand how it got its name, which means "black water"—the water is so clear and so deep that it looks like clear coal.

Tazin Lake Lodge is an orderly collection of log buildings—cabins, dining hall, out-buildings and, so help me, a steam bath—built mostly of native materials, since everything else must come in by float plane. Built by former Ontario outfitter Bill Pullar with his wife, Agnes, and son Vince, the place isn't fancy, but it's comfortable, and has a staff of 15 to handle 20 fishermen.

My host was Vince Pullar. He introduced himself, led me to a cabin, introduced my guide and fishing partner, Richard "Chummy" Heron, and suggested I go fishing. I did.

Chummy and I started fishing after a half-hour run across the lake (fishermen *always* go across the lake, no matter how good the fishing is off the end of the dock), casting a rocky shore line with wobbling spoons. After fifteen minutes with no

strikes, I asked what happened if we didn't catch a lunch fish. Chummy admitted that, while he'd been there since the camp was started, that had never happened. At eleven o'clock you started looking for a lunch fish, a nice three or four-pound laker, and by noon you'd found one to suit your taste. Ten minutes later we had two to pick from. They were excellent.

I insisted on casting with light tackle and half-ounce lures most of the first day, looking for big lakers on the surface, since Tazin's surface water is cold enough that they need never go deep. We caught enough trout—and an occasional northern—to make a great day anywhere else, but nothing over six or eight pounds. Lunch fish, Chummy called them. After a wild flurry two days before, during which the party of 10 had taken their trophies, the bigger lakers had disappeared from the surface waters. Switching to heavier tackle and big wobbling spoons as we trolled toward the lodge for dinner, we found better trout in the middle depths—20 to 30 feet down produced an occasional 10 and 12-pounder.

Don't let any southern bass fisherman knock the laker as a game fish. Dredged up from 120 feet of temperate-zone water, as in this country, they're pretty tame compared to sportier surface-feeders. But taken near the surface on bass-and-lighter tackle, they're tough. They won't jump like a rainbow, but they fight as hard and last twice as long. Their fight is mostly vertical as they dive toward the rocky bottom. Given enough line, they'll rub off a lure or tear off a light line easily. And on six-pound spinning tackle, an eight-pounder can take it down against your will pretty easily; a 12-pounder is a real handful; better than a lot of big northerns and as well as most still-water trouts.

(Continued to page 200)



Miners Dig Cavern in Granite to Store Gas

After 13 months of mining, engineers recently hewed out a cavern from the granite 380 feet below the Sun Oil Co. refinery at Marcus Hook, Pa. They then faced the problem of removing the air from that mammoth cave—it embraced 2.2-million cubic feet—since the hole was

for storage of propane, and air would make the atmosphere explosive.

Some 112 tons of carbon dioxide were pumped in by the Chemetron Corp., forcing the air out the exit. Eventually 400,000 barrels of propane were pumped into the hole, displacing the carbon dioxide.

Primitive Weapons Guard Our Jets



PRIMITIVE NEGRITOS, Asian pygmies, guard supersonic jets at Clark Air Force Base in Philippines

NEGRITO NATIVES lived in the Philippine Islands long before Magellan.

Today, relatively unchanged, they guard the supersonic jets of the United States' Air Force—with poisoned darts and arrows.

This strange juxtaposition of aborigines and a modern fighting force is the product of recent history. During World War II, the Negritos—whose pygmy ancestors settled there 30,000 years ago—fought bravely with American guerrillas against the Japanese, and won the undying gratitude of the U.S. government. Usually they would ambush Japanese patrols with their poisoned weapons, but some accounts credit them with stealing into Japanese camps at night and beheading the sleeping soldiers. The Japs offered a reward of 1000 pesos (about \$500) for the capture of any Negrito.

After the war, the Negritos were offered jobs at Clark Air Force Base and other strategic locations. They patrol Clark's 23-mile-long perimeter, moving silently through the man-high grass that surrounds the field and, with weapons used centuries ago, protect America's modern air might.

NEGRITO GUARDS, who seldom reach five feet tall, work closely with much bigger American air police





BARBECUING NEEDN'T STOP when summer ends. Steaks, hamburger, chicken and other foods can go right on sizzling with Manesco's (Manhasset, N.Y.) Charco-Broiler—a stainless, gas-fired kitchen unit that evenly distributes heat from a bed of ceramic coals that don't deteriorate

WHAT'S NEW FOR Your Home



A WALL HAT RACK without screws or nails, this adhesive-backed plastic rack sells three for \$2. Cornelia Sales, Cornelia, Ga.

HANDY DOLLY, a wheel and spring with dual hooks, slips under a can or barrel which can then be wheeled easily. \$2.98 ppd. from Pocket Dolly, 1216 S. Lorena St., Los Angeles 23, Calif.



QUICK FASTENER applies snaps to clothing you make or for repair jobs. Also handy for matching socks on washday. \$4.95 with a pack of snaps—from Zip Co., 600 Pleasant Ave., St. Paul, Minn.



ELECTRIC, PORTABLE and smokeless, Rival's Broil-O-Mat uses "Air Space" design to turn out tasty tableside food with a cook-out flavor. It's available at retailers for \$9.95 complete



MISSILE RESEARCH developed tungsten carbide plating that Robeson Cutlery (Perry, N. Y.) coats Flame Edge knives with, to make a super-hard cutting tool that stays sharper longer. From \$2.25, depending on size, at retailers



SPACE-SAVING GARDEN CART is an easy-to-handle yard helper with a six-cubic-foot capacity. With a flexible steel bottom and fabric sides, the cart collapses for storage in a small space or for hanging on a wall. If the canvas fabric tears or becomes soiled, replacements are available. The cart weighs 18 pounds. The Snap-Flat cart is available for \$14.45 ppd. from the manufacturer, Zik Mfg. Co., Box 525, Lancaster, Pa.

BUSY MOTHERS need not stop to give baby a bottle. Nurse E-Z bottle holder by Nel-King Prods., 811 Wyandotte, Kansas City 5, is flexible, adjustable and attaches to a crib or high chair. \$9.95 ppd.



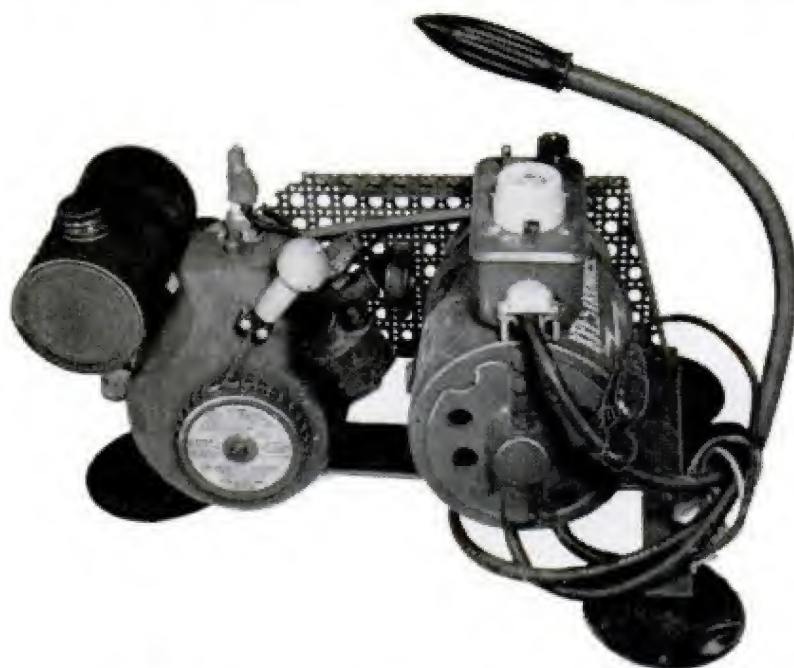
JUST SKEWER FOOD, lift, squeeze the handle, and the pusher ejects the food. This Hand-E-Fork is a new stainless spring-steel serving fork to aid in serving hot and cold meats, fowl and baked potatoes. It needs no polishing to keep it from tarnishing. Packed in a plastic gift box, Hand-E-Fork is 8½ inches long and has no breakable parts. It's \$1.98 ppd. from Hand-E-Fork, P.O. Box L 23, Calabasas, Calif.



ARMLOAD OF POWER

*Pigmy power plant
charges batteries,
is handyman for
boaters, campers*

By James Joseph



TINY PLANT, teamed with pump, moves 250 gallons of water an hour. Marina operator swabs pier, decks



CAMP LIGHT is powered handily by 200-watt plant. In use, it would be stashed in woods out of hearing

IN THIS AGE of miniaturization, good things keep coming in smaller packages. One exciting new result of thinking small is a 22-pound power plant that can generate both 110-volt, 60-cycle alternating current, and 6 to 12-volt direct current.

It can recharge a car battery, pump dry a flooded basement, power a boat transmitter, or perform hundreds of other chores around home or campsite.

Called Charge-R-Lite, the 200-watt unit teams a 3 $\frac{1}{4}$ -pound, $\frac{3}{4}$ -horsepower gasoline engine to an a.c./d.c. generator using 8 silicon diodes in place of armature and commutator windings to save weight.

Teamed together, they make a package 9 inches wide, 11 inches high and 16 inches long.

Exclusively field-tested by the author during a rugged 150-mile cruise of the lower Colorado River, the power team proved amazingly versatile both afloat and ashore:

- **Afloat**, it powered a searchlight, an electronic megaphone, and provided 110-volt a.c. electricity for predawn shaving; switched to d.c., it twice revitalized anemic boat batteries.

- **Ashore**, it simultaneously ran a 100-watt light and a phonograph, turning our



MORNING SHAVING aboard boat is no problem: Pull the two-cycle midget motor's starter cord, open the choke and it revs up to 6300 r.p.m., belt-driving a.c./d.c. alternator, supplying 110-volts a.c. for razor

sand-bar camp both bright and light-hearted.

It's also easy to use. Pull the starter cord on the two-cycle, air-cooled, single-cylindered engine, open the choke and it revs up to 6300 r.p.m., belt-driving the alternator at 3600 r.p.m. Plug a cord into the a.c. receptacle, or attach the two d.c. clamps to your battery's terminals and, with a flick of the a.c./d.c. toggle switch, you have lots of power to do lots of things.

This power plant will quick-charge boat batteries in less than 15 minutes, provide direct current for testing TV or be an electrical standby in a home shelter. Or it will

man a midget pump for draining basement sumps, filling house-trailer water tanks, or emptying the washing machine should it go on the blink. It uses only $1\frac{1}{4}$ pints of fuel (regular outboard motor oil-gas mix) an hour while performing such tasks.

While the tiny plant cannot run high-wattage appliances such as hot plates, coffee makers or portable tools (unless they're equipped with small brush-type motors), it has a surprisingly wide range of application, thanks to the recent spate of miniaturization.

"We'd no more than announced our power source than half-a-dozen manufac-



TO RECHARGE car battery, merely attach the power plant's d.c. alligator clamps to proper battery terminals (the positive clamp to battery's positive terminal), crank motor to start, then flick control switch to d.c.

turers hit the market with items which, being low-wattage, were just made for it," says the powerplant designer, Bernie King, president of Krestronics, Inc., El Segundo, Calif. Typical of the items is a \$29.50 pump, the Pony, made by Proven Pumps. It consumes only 115 watts, pumps four gallons a minute.

Pump and power plant can fill stock-watering tanks, irrigate garden patches, push descaling compounds through air-conditioning piping, pump out a boat's bilge, circulate fresh water in bait tanks or transfer most noncorrosive liquids (but hydrocarbon derivatives such as gasoline, benzene and methane may attack the pump's synthetic-rubber impellers).

The midget accessories, of course, are not designed for sustained operation. Says one engineer, "They are tools and, like other hand tools around the shop, they're meant for intermittent use, not for long, uninterrupted chores."

Charge-R-Lite, itself, is an example of such limitation. It does not have power enough to operate air blowers in a bomb shelter, but, on the other hand, it will provide power for lighting for a shelter. To keep fumes and noise out, however, the engine would probably need to be outside and an a.c. extension cord could be run to the shelter.

Although Charge-R-Lite is small, it is rugged—right down to its generator's fuse-sized diodes. They weigh, altogether, less

than two ounces but do double duty. Grouped in two tiny bridge circuits, they both self-excite the alternator's field coils and rectify a.c. to d.c.

Magneto Ignition

The engine (designed by Ohlsson & Rice, longtime makers of model-airplane engines) boasts magneto ignition. It has a tiny spark coil, condenser and standard 10-mm. spark plug; a governor which holds engine speed to a maximum of 6300 r.p.m.; carburetor, and drive shaft. Big in everything but size, it is 5¾ inches long and is 5¼ by 6 inches wide, fitting neatly into a fishing tackle box. Limited by its pint-sized fuel tank to runs of about 45 to 60 minutes, it goes six to seven hours on a gallon of fuel. Moreover its relatively high noise level can be hushed with a \$2.30 muffler. Since engine power is reduced by the muffler, King suggests stashing the engine out of sight and sound and bringing the power to camp with an extension cord. You can similarly isolate the unit afloat by planting it near the bow. Its three suction cups, which serve as shock suspension, hold fast to any flat, smooth surface. Simply run an extension cord to the cabin.

Priced at \$149.50, this carry-it-with-you power plant hands the boater a full-fledged auxiliary, the camper a back-packable a.c./d.c. supply, and the home-owner a portable tool as versatile as any in his shop.

★★★



New Breed of "Cat" Features Four-Step Hull

Combined in a radical outboard "cat" are the stability and power tolerance of a catamaran with the speed of a stepped hydroplane. Powered by twin 80-horsepower outboards, the boat averaged 67.13 miles per hour over a choppy 65-mile course when it swept the pleasure-craft division of the WinnebagoLand Marathon in Wisconsin.

Built of marine plywood over foamed plastic for light weight, the 18½-foot, 8-foot-wide craft weighs 950 pounds, and planes high on four steps, two amidships, two aft. With the driver and passenger seated in twin cockpits in the main hulls, the deck between the hulls forms a thin airfoil section, and the craft takes on lines more similar to a true catamaran than the current run of powered cats. Lift from the airfoil, coupled with an air compression effect in the venturi between the hulls and under the center deck, gives the boat a very high planing attitude at speed, with a resultant

reduction in drag. At the same time, the four-step hull feature keeps the hull stable, and the design places the center of lift astern of the center of gravity to prevent "kiting"—the boat won't lift itself out of the water and flip.

Twin plywood fins cover the tall outboards to reduce air resistance, but air-scoops in the fins insure plenty of air for the motors. The fins prevent the motors from tilting forward, however; they're locked in position for racing.

Driver for the Marathon was Bob Switzer, of Crystal Lake, Ill.; passenger was brother Dave Switzer, who designed the craft. Their Switzer-Craft company will build the Hydro-Cat to order through their dealers; price will be \$2995 ready for motors. Tests are under way on another version, designed for a single 100-horsepower motor and expected to sell at approximately the same price.



BOTTOM VIEW of hull shows steps and hull shape. Airflow through "tunnel" under center deck produces lift to reduce drag

You Can Win the War on Weeds

By
James N. Miller

WHEN YOU LAUNCH your offensive against weeds this spring, there'll be eight new killing chemicals that may help you win the war.

In addition to this arsenal, new and more effective tactics have been found for using chemicals and sprays that have been on the market before.

This good news for embattled homeowners and farmers—whose weed problems cost them about \$5 billion last year—comes from the government center for agricultural research at Beltsville, Md. There, an eight-man scientific task force, led by Dr.

W. B. Ennis, Jr., has proved that homeowners and farmers can keep their lawns and crops almost entirely weed-free by spraying these recently developed herbicides at recommended rates and times.

To combat crabgrass, the researchers recommend a pre-emergence treatment in spring before crabgrass germinates, using dacthal, calcium arsenate or zytron, which still are a fine trio for heading off crabgrass. One application of any one of the three gives good control for a full season. But don't apply them on soil that is to be seeded or that has recently been seeded.



Meet Some New Killers Science Has Discovered



PILLS KILL TREES. Used primarily to rid large areas of unwanted trees, these fenuron compound pills (trade name: *Dybar*) attack root systems

*(E. I. du Pont de Nemours
Wilmington, Del)*

DMA (disodium menometheyl arsenate) or PMA (phenyl mercury acetate)—two of the eight new killer chemicals—give good post-emergence control of crabgrass. Starting soon after the crabgrass emerges, make three applications of one of these herbicides at 7 to 10-day intervals.

You'll need about 8 to 10 gallons of PMA or DMA spray for the average size front lawn of 50 x 100 feet. Total cost shouldn't exceed \$5. Where grass is quite short (as on a putting green) use PMA at half the usual rate and avoid its use on Merion bluegrass which it sometimes will injure. Apply DMA only to moist soil and keep it moist for a few days after each application.

For keeping strawberry plants weed-free, the newly-proven sesone (2, 4-dichlorophenoxyethyl sulfate) is the bright hope. Remove any existing weeds first, as sesone is effective only when applied to the soil, where microorganisms convert it from an inactive to an active form which is absorbed by the root systems of germinating weed-grasses and broadleaved weeds. Sesone should be applied at the rate of about three pounds to 10 to 20 gallons of water per acre.

To control plantain, dandelion and other broad-leaved weeds in lawns, the old fighter 2, 4-D (dichlorophenoxyacetic acid) is still good. Use one ounce or two tablespoons of an amine salt of 2, 4-D per gallon of concentrate in two gallons of water per 1000 square feet.

To fight chickweed and its broadleaf cousins that plague your lawn, there is another new chemical killer called silvex (2, 4, 5-trichlorophenoxypropionic acid). Use one ounce of silvex in two gallons of water per 1000 square feet. The scientists also suggest a half-and-half mixture of silvex and 2, 4-D for use on the other broadleaf weeds.

To combat quackgrass and other weedy grasses (Bermuda, Johnsongrass, etc.) a promising new weed killer is dalapon (dichloropropionic acid) applied as foliage spray. The sodium salt of dalapon is, in this instance, the widely used compound, although ammonium salts are also used. Dalapon has shown promise for Southern farmers in controlling weeds in sugar cane, sugar beets and for spot-treatment control of Johnsongrass and other grasses in



NAMES OF WEED KILLERS AND

CHEMICAL	TRADE NAME	MANUFACTURER
Sesame	Scutl (Phenyl mercuric salt)	Amchem Products, Inc.
NPA	Alanap-3 (Sodium salt)	O. M. Scott
	Alanap-3	U.S. Rubber Co.
	Alanap-3	Chipman Chemical Co.
	Alanap-3	Allied Chemical Corp.
	Alanap-3	California Chemical Co.
	Alanap-3	Stauffer Chemical Co.
	Alanap-3	Woodbury Chemical Co.
	Alanap-10-G	Allied Chemical Co.
	Alanap-10	California Chemical Co.
Dacthal	Chip-Cal	Diamond Alkali Co.
Calcium Arsonate	Crab-E-Rad	Chipman Chemical Co.
	No-Gro	Vineland Chemical Co.
	Turf-Sel-Pe	Vineland Chemical Co.
	Unico Crabgrass Granules	Doggett-Pfeil Co.
Zytron		United Co-Operative, Inc.
Silvex		Allied Chemical Corp.
		Dow Chemical Co.
		Chipman Chemical Co.
		Miller Products Co.
TCA	Chickweed & Clover Killer	California Chemical Co.
	ACP Grass Killer	Dow Chemical Co.
		Chipman Chemical Co.
		Sherwin-Williams Co.
	Quackil	Parsons Chemical Works
	Rite-O-Way	Allied Chemical Corp.
	Stantox	Standard Agricultural Chemicals
	STCA	H. P. Rossiter & Co.
	T-H	Thompson-Hayward Chemical Co.
	Unico—Grass Killer	United Cooperatives, Inc.
Dalapon		Dow Chemical Co.
Simazine	4G	Gelgy Chemical Corp.
	80W	Gelgy Chemical Corp.
TBA	"Trysben" 200 Weed Killer	E. I. duPont de Nemours & Co., Inc.
EPTC	Eptam	Stauffer Chemical Co.



TEST FIELD at Beltsville includes 4224 separate plots for testing chemicals on fruits, vegetables and weeds

cotton. It has been effective in controlling cattails and phragmites on irrigation and drainage canals.

Another new quackgrass killer is TCA (trichloroacetic acid), although test results with it have varied in effectiveness. It is also somewhat caustic and does corrode spray equipment.

Chickweed in alfalfa has been a serious problem to farmers in the northeastern United States. For controlling this weed, the Beltsville R and D men recommend another new killer, DNBP, a dinitro com-

pound. They suggest a spray made of $\frac{1}{2}$ to $\frac{3}{4}$ pounds per acre in 20 to 40 gallons of water placed on the weed when it first appears in the fall.

To keep squash, snapbeans and cucumbers free of broadleaf, annual grassy weeds, researchers recommend another new herbicide called NPA (n-1 naphthylphthalamic acid), and that gardeners follow the instructions on the labels of commercial compounds containing this chemical.

Farmers still use over 30 million pounds of 2, 4-D each year on crop lands, because

WHAT THEY ARE CALLED IN STORE

CHEMICAL	TRADE NAME	MANUFACTURER
DMTT	Crag Mylone	Union Carbide Corp.
SMDC	VPM Soil Fumigant	E. I. duPont de Nemours & Co., Inc.
	Vapam	Stauffer Chemical Co.
MCP	MCP Amine Weed Killer	Agasco, Inc.
	Crop Rider MCP Amine	Diamond Alkali Co.
	MCP Amine Weed Killer	Dow Chemical Co.
	MCP Amine Weed Killer	Allied Chemical Corp.
	MCP Amine Weed Killer	Sherwin-Williams Co.
	Methoxone	Chipman Chemical Co.
	MCP Amine 4	Monsanto Chemical Co.
	Stantox MCP Weed Killer	Standard Agric. Chem.
	MCP Amine	Stauffer Chemical Co.
	Sure Death MCP Amine	Woodbury Chemical Co.
	Ded-Weed MCP	Thompson-Hayward Chemical Co.
	Weedar MCP	Amchem Products, Inc.
PMA	PM2, 4-D	W. A. Cleary Corp.
DMA	"Oust" Crabgrass Killer (DSMA)	E. I. duPont de Nemours & Co., Inc.
	Hose-It-On Crabgrass Killer	Acme Quality Paints
	Liquid Disomar	Bonide Chemical Co.
	Crabgrass Killer	Breck's
	Crabgrass Killer	Chemical Formulators, Inc.
	Clout	O. M. Scott
	Crab-E-Rad	Vineland Chemical Co.
	Crabgrass Fix	Thompson Chemical Corp.
	Crabgrass Destroyer	Lebanon Chemical Co.
	Di-Met	O. E. Linck Co.
	Methar	W. A. Cleary Corp.
	Crabgrass Killer	Miller Chemical Corp.
	Artox Sodar Crabgrass Killer	Nott Manufacturing Co.
	Crabgrass Killer	Pearson-Ferguson Chemical Co.
		SaminCorp
	Ded-Weed Crabgrass Killer	Thompson-Hayward Chemical Co.
	Unico Crabgrass Killer	United Co-Op., Inc.
	Weedone Crabgrass Killer	Amchem Products, Inc.

2, 4-D is supplied by a great number of manufacturers.



FIELD TRIALS also include use of experimental spraying equipment such as this vehicle. Air tank forces spray

the compound kills many broadleaved weeds, especially those found in pastures, in wheat, corn and other grains. Ordinarily, less than a pound of 2, 4-D per acre is required when it is mixed into a liquid spray.

Herbicides are sold under a number of trade names and some, especially the new ones, are not always available from local garden-supply dealers. But they usually are available from agricultural chemical dealers.

Six other new herbicides have shown promise in tests conducted by the Beltsville

agricultural research scientists. Since all have long chemical formulas and are in short supply for purchasers this year, only their nicknames or initials will be cited: Simazine, TBA, EPTC, DMTT, SMDC and MCPB.

Simazine is a wettable powder with low solubility in water and organic solvents. It is being tested for pre-emergence weed control in corn, transplanted tomatoes and fruit crops. As a soil sterilant, Simazine has been effective when applied at heavy rates.

(Continued to page 228)



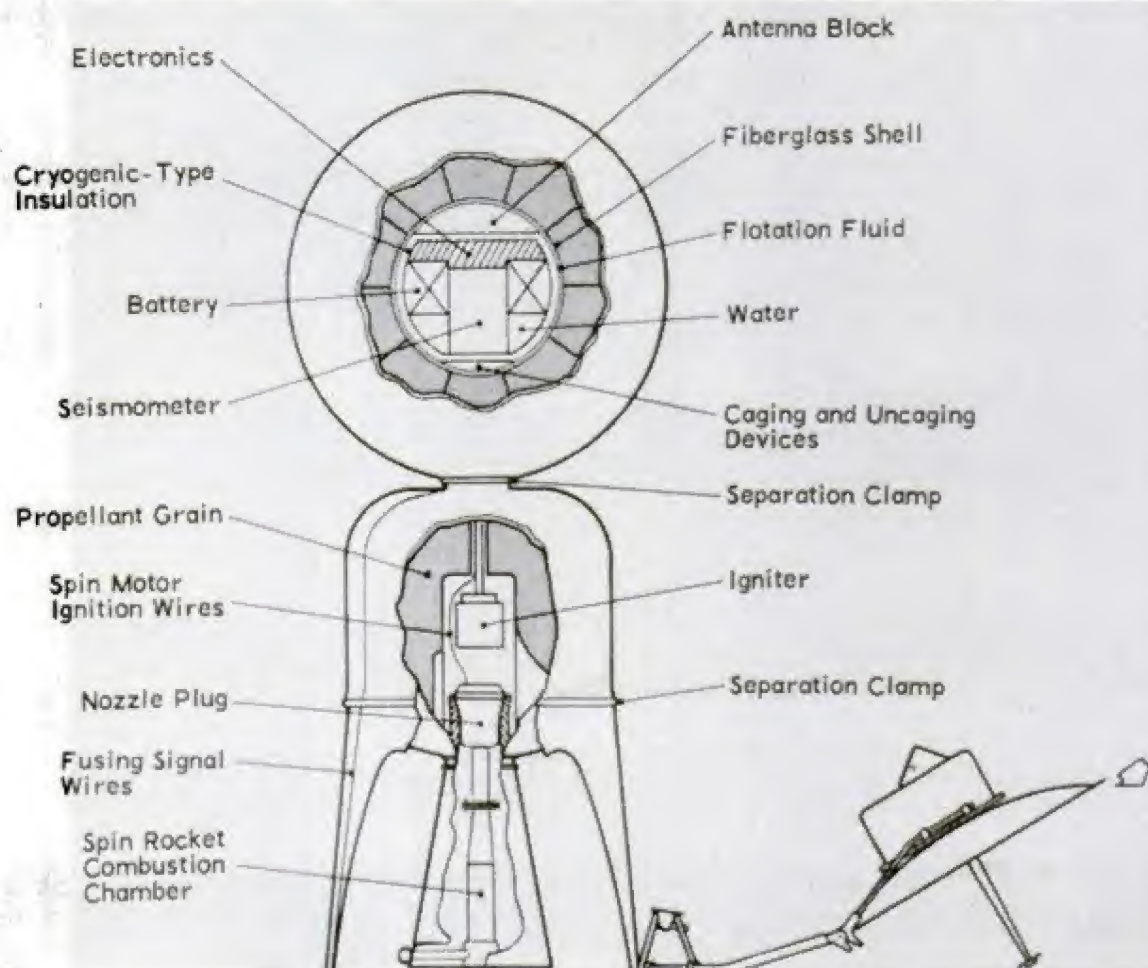
Ball of Balsa for the Moon

Here's the type of instrument-laden ball scheduled to be landed on the moon at a speed of about 150 m.p.h. this year.

Measuring 25 inches in diameter and weighing 325 pounds, the ball contains a seismometer to measure moonquakes, temperature-recording devices and radio equipment to send information to Earth.

The ball is designed to be ejected from a Ranger spacecraft some 25 miles from the surface of the moon.

MOON SPHERE, upper left, is attached to a retrorocket which slows it down; ball and rocket are shrouded in aluminum for Ranger rocket ride from Earth. Instruments ride in smaller ball floating inside balsa





Motels are Rolling Down the Highways

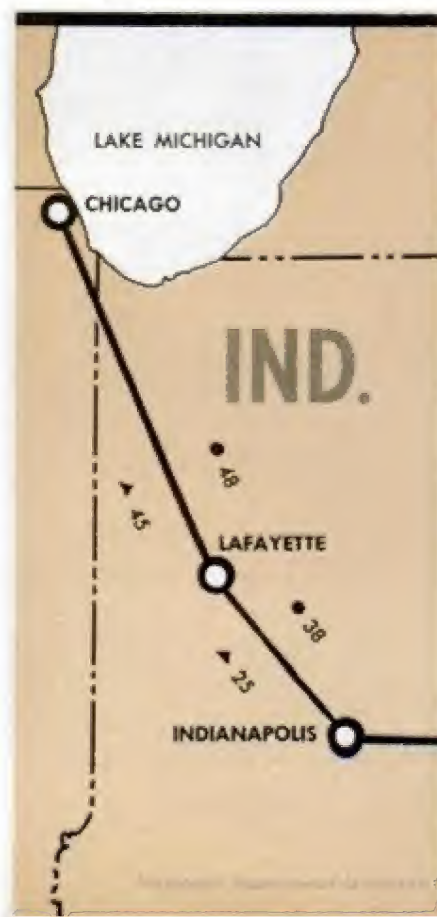
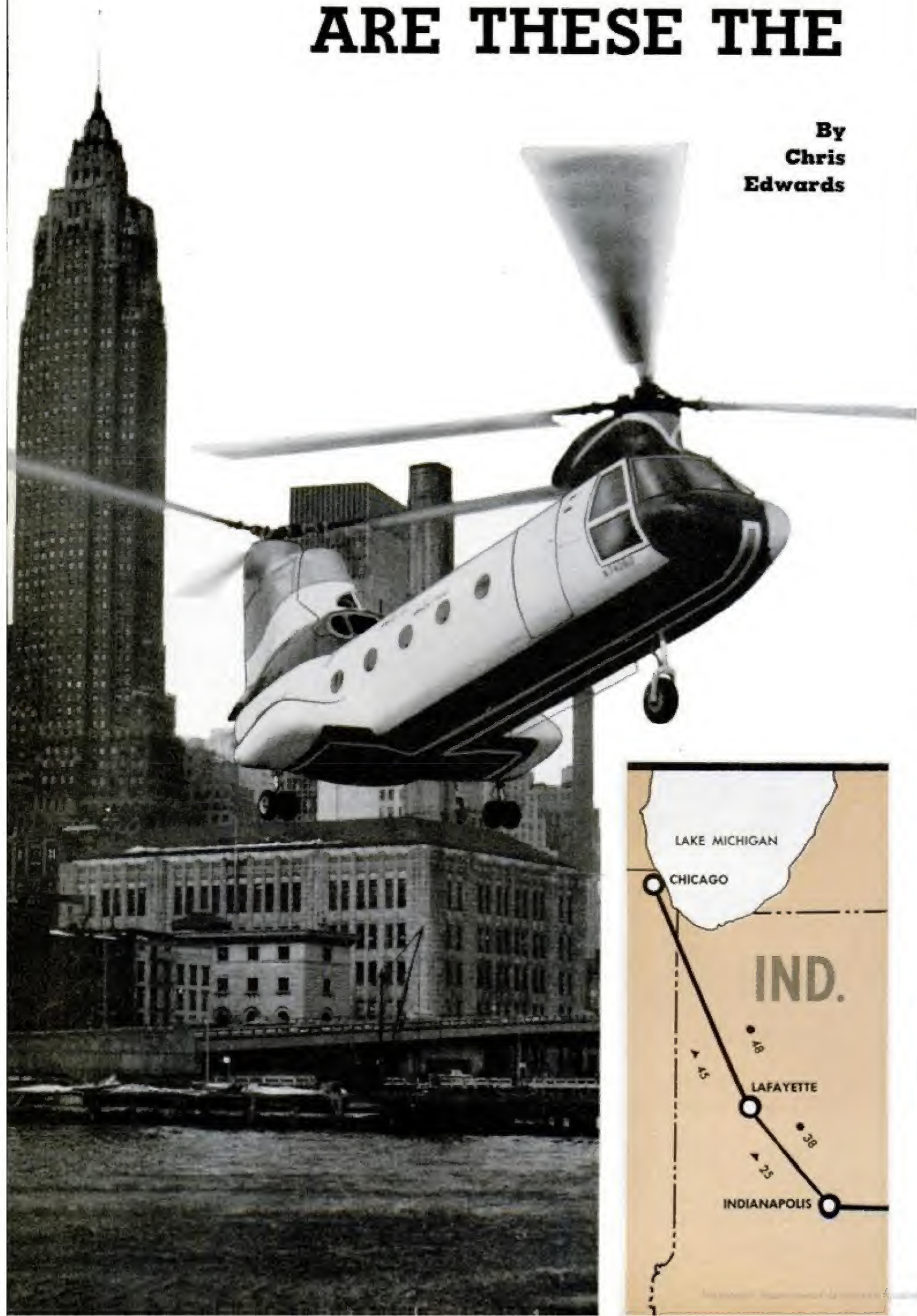
To meet a booming demand for motel rooms, an Indiana manufacturer is putting two, three and four rooms in a section which, much like a house trailer, is towed to the installation site. The motel owner

just puts sheets on the bed, towels on the rack, hooks up the gas, lights, water and sewer, and the rooms are ready. Hart Industries, Elkhart, says its motels can be installed for less than \$2500 per room.



ARE THESE THE

By
**Chris
Edwards**



NEW AIRLINERS?

Already flying from downtown to airport, giant rotary aircraft may now take off cross-country, carrying passengers from the heart of one city to another, slashing total trip times

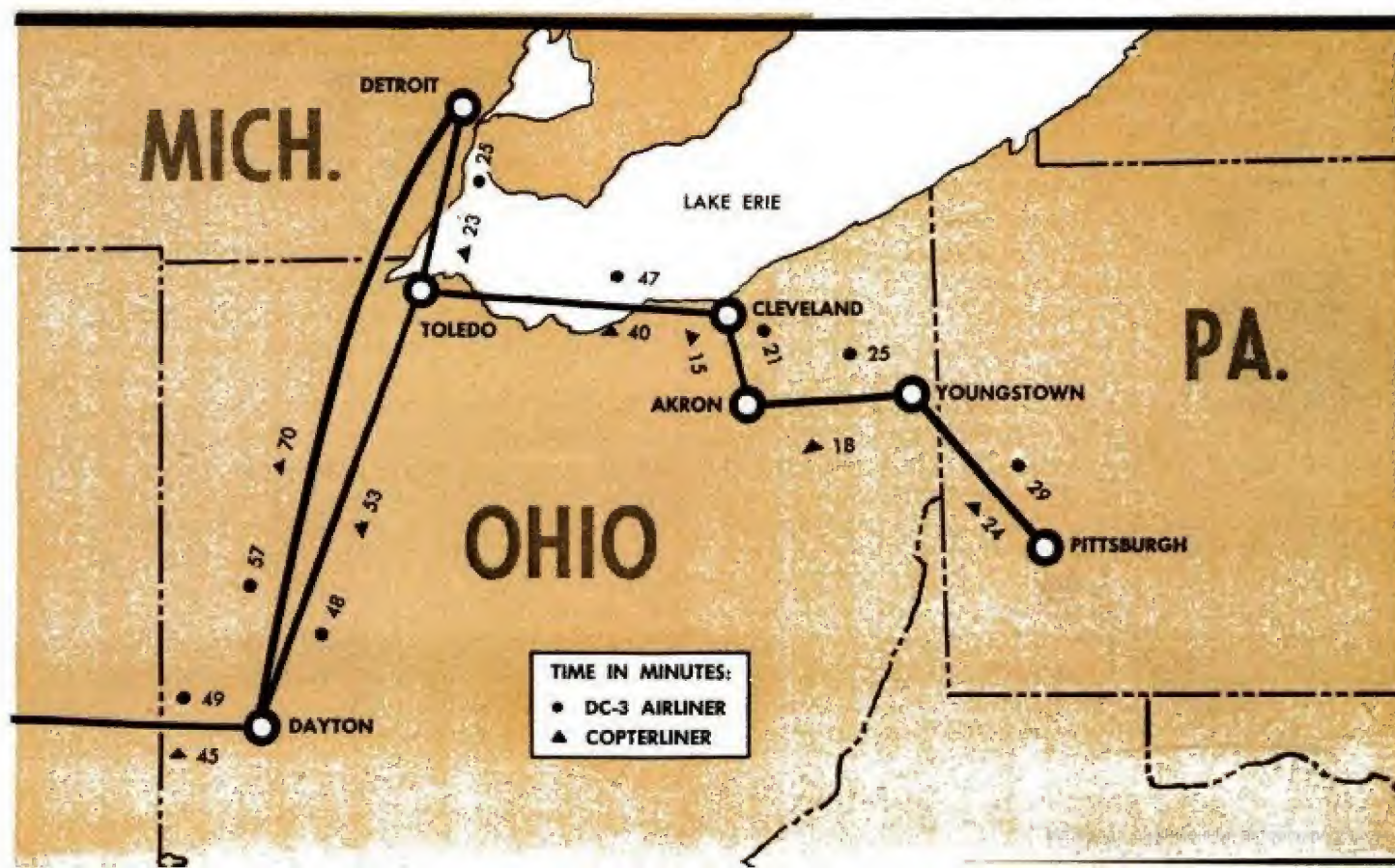
HELICOPTERS ARE ON THE VERGE of changing short-range air travel the way the big 707 and DC-8 jets changed long-range air travel—by slashing trip times.

Airline passengers on short air hops now spend up to two thirds of their total travel time on the ground. Even on long trips, time on the ground is still the big bottleneck. Cruising close to the speed of sound, a jetliner covers the distance between Chicago and New York in about two hours. But, if you are an average passenger, you still spend more time on the ground getting to and from the airports at each city than you spend in the air. Not until you fly more than 1200 miles does the jetliner portion of a trip exceed the average ground time. And, as more and more jetports move farther into open country, where space for long runways is available and the noise bothers fewer people, ground travel times will continue to grow longer—not shorter.

Where does this leave the air traveler who flies from Los Angeles to San Diego, from New York to Washington or from Chicago to Podunk? Mostly on the ground.

But new twin-engine helicopters recently certificated for com-

HELICOPTER AIRLINERS, like the new Vertol 107 (left), can equal or better trip times of regular airliners on short routes, as shown in map below. Big advantage, however, is their ability to land in center of town





FAIREY "ROTODYNE," British autogyro, uses turboprops for forward speed, jet-tipped rotor for vertical flight

mercial flights make trips up to 200 miles practical between city centers. Two big helicopters, the Boeing Vertol 107 and the Sikorsky S-61, boost flight speeds to 150 m.p.h.

Recently, a Vertol 107 spent nine days simulating operations between cities along part of Lake Central Airlines' routes. The map on pages 138-139 charts current airliner flight times between airports along some of Lake Central's air routes and, for comparison, Vertol 107 flight times along the same routes. On flights up to about one hour, the 107 'copter equaled or bettered Lake Central's presently scheduled flight times. On longer flights the higher speed of conventional fixed-wing transports edged out the slightly slower helicopter.

But actual time in the air over these routes is only part of the story.

Take the trip between Chicago and Lafayette, Ind., for example. Air distance is about 120 miles. If you flew Lake Central's Flight 153, you could board a limousine at a Chicago Loop hotel at 9:45 a.m. bound for Midway Airport on Chicago's southwest side. You would arrive at the airport about 45 minutes later. At 11 a.m. you would board a DC-3, and 48 minutes later the door would open at Lafayette. After another 43 minutes, including baggage claim and pick-up time, you could be in downtown Lafayette. Total time between city centers—nearly three hours!

On a helicopter, the same trip would take

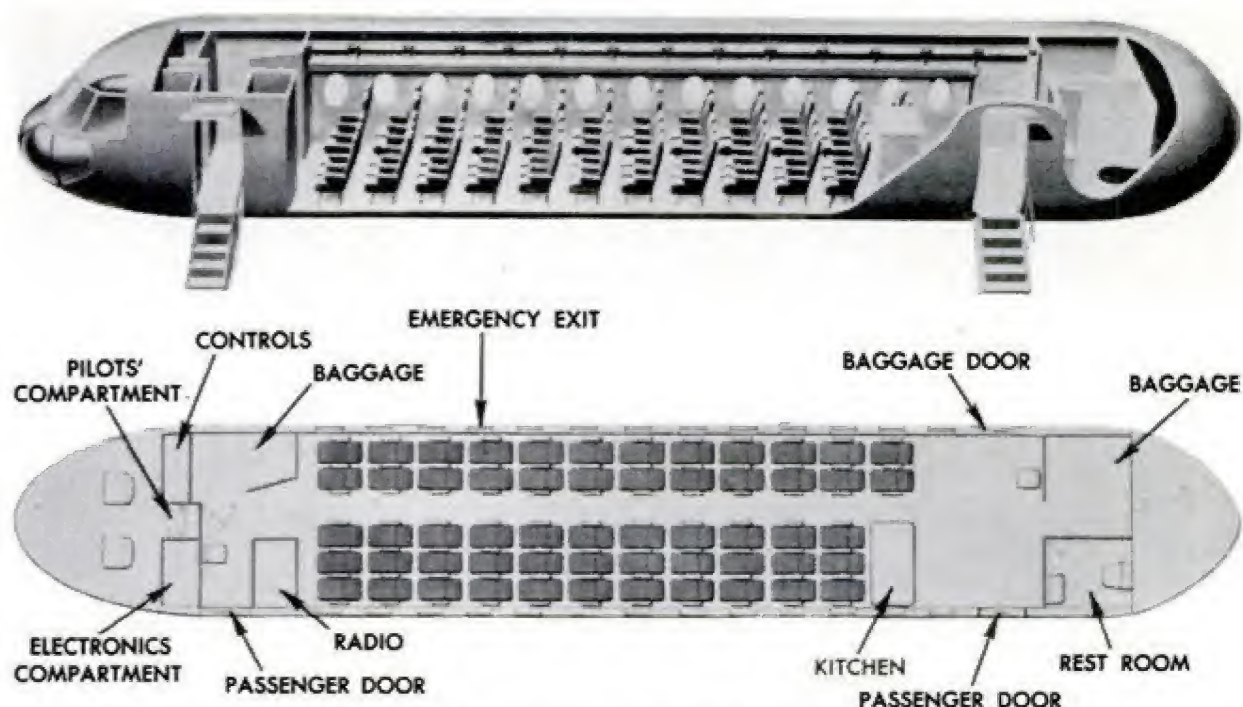
just over an hour — including time for checking in and for handling baggage. By leaving from a heliport on the lake front just outside Chicago's Loop, or from a building-top heliport, you could be in downtown Lafayette before you would have taken off from Midway on Flight 153.

Until the twin-engine Vertol 107 and Sikorsky S-61 transport helicopters appeared, true vertical takeoffs and landings were not permitted with passengers aboard. In contrast, single-engine helicopters are required to lift a few feet off the ground, then accelerate in a flight path close to the ground until they reach a safe airspeed for climbing. So short runways are necessary when carrying passengers. These operations are required because a failure of the single engine close to the ground would allow smaller helicopters to drop too far before autorotation of the overhead rotor could slow the descent to a safe sink rate.

With two turbine engines, both the Vertol 107 and S-61 can take off and land vertically. In case one engine fails, the helicopters continue to fly on the second engine or gently descend to the takeoff point. Either or both engines drive the two tandem rotors on the Vertol 107 through an ingenious gearbox. Twin engines also provide all-weather capability under civil-air regulations and permit passenger flights to and from heliports on top of buildings or from built-up congested areas.

Local-service airlines, such as Lake Cen-

CUTAWAY OF ROTODYNE



SPACIOUS INTERIOR seats 57 passengers, many more than most short-haul airliners. Venerable DC-3 seats 21

TRAVEL TIME BETWEEN CITY CENTERS BY ROTODYNE

	Rotodyne	Airline limousine	'Time saved by Rotodyne
New York-Washington	1:27	2:33	1:06
Detroit-Chicago	1:38	3:36	1:58
Boston-New York	1:21	2:54	1:33
Syracuse-New York	1:23	3:00	1:37
Los Angeles-San Diego	0:42	2:30	1:48
Chicago-St. Louis	1:45	3:48	2:03

IT FLOATS! Although not intended as normal routine, 107's amphibious ability might be used in emergency





SIKORSKY S-61 also uses twin turbine engines, but they drive single large rotor and small tail rotor. Turbine engines make the new helicopters not only more powerful, but less noisy



HELICOPTER INTERIOR can be as plush as airliner. Seating in both 107 and S-61 can be arranged to accommodate 28 people

tral, are not required to compete with other airlines because of the low-traffic density. In fact, all local carriers now receive subsidy payments from the federal government so smaller cities can enjoy the benefits of fast air mail service and air connections to large jetports for longer trips. However, local-service carriers must now actively compete with bus and rail lines that connect city-center areas directly. Between some cities, actual travel times between downtown areas are less by bus than the combined ground-and-air time when using airliners such as the DC-3 or even the new F-27 turboprop. Only by offering direct air service between downtown areas can travel times be cut sharply. The new generation of twin-engine helicopters are a giant breakthrough toward this goal of cutting total travel time.

Will the new helicopters be able to compete on fares for intercity trips? To get a clear picture on this point, let's take the Chicago-Lafayette trip again. Lake Central's current air fare between the airports

at these two cities is \$10.05 plus 10 percent Federal tax or \$11.06. But limousine fare from Chicago's Loop to Midway Airport is \$1.45 and at Lafayette, about \$1.25 for a total of \$2.70 for ground transportation—nearly 25 percent of the air fare. (Taxi fares would be higher.) On a shorter hop, say between Cleveland and Akron, Ohio, limousine fares would total about 50 percent of the air fare.

In contrast, although intercity helicopter fares have not been set at this writing, it is known that the direct operating costs of a Vertol 107 helicopter are about double the costs for a Fairchild F-27 turboprop (6½ cents per seat mile versus 3½ cents per seat mile over a 100-mile flight). Projecting these figures, 'copter fares would still exceed the combined air travel-ground travel costs of using a conventional airliner. Either some subsidy or passenger willingness to pay extra for the time gained would be needed at the present time for longer flights from city center to city center.

(Continued to page 220)



PRECISION LEVELING is permitted with the new indicator built into the top of this stereophonic record changer. Compensating for uneven floors, tables, extends record life. Admiral Corp., Chicago, 47, Ill.



GETTING ALL YOU PAY FOR? This meter plugs into a wall outlet, continuously monitors line voltage delivered to your home. If certain appliances act up, low voltage could be blamed. RCA, Camden, N.J.

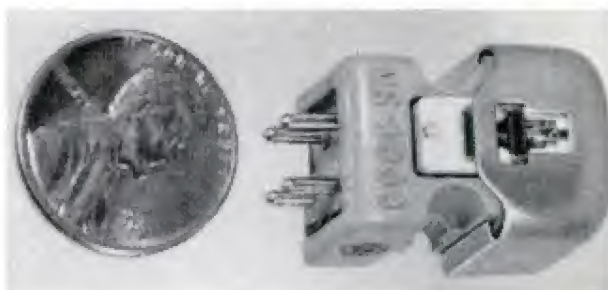


Electronically New

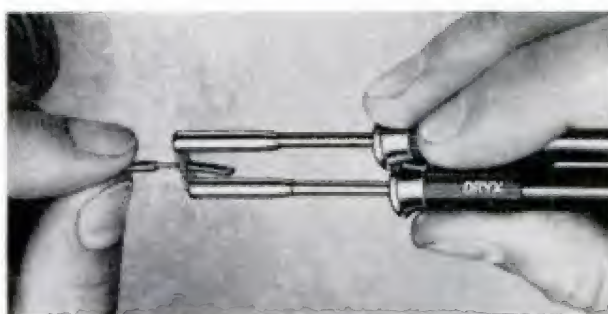
RADIO PRIVACY is assured by this voice scrambler. Normal speech is converted to gibberish over the air. A matching scrambler at receiver unscrambles the confidential talk. Delcon Corp., Palo Alto, Calif.



CONVENIENT INSTALLATION of TV antenna wire is obtained by using this package. Line is fed out as you need it, balance is maintained tangle-free on the inside. Saxton Products, 4320 Park Ave., Bronx, N.Y.



STEREOPHONIC CARTRIDGE designated "Orthonetic" by manufacturer, comes in two styles. One for changers one for manual machines. Universal mount fits all type arms. General Electric Co., Syracuse, N.Y.



HOT LITTLE STRIPPER really takes it off! Insulation, that is. Unit connects to transformer, heat and pressure strip insulation. Features replaceable tips. West Manufacturing Co., 5979 West 3 St., Los Angeles, Calif.

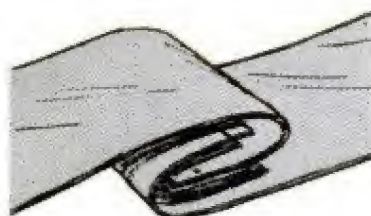
PM Shopping Guide



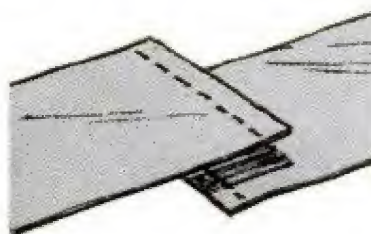
TENT FABRICS vary greatly in weight and thread count. Text identifies each of these fabrics



TELESCOPING aluminum poles are light and handy, especially if they're adjustable so you can raise or lower the pole to compensate for stretching or shrinking of the material



LAP-FELLED or French seams fold four layers of material together to make a stronger, more water-tight seam with no edges



FLAT SEAMS, less costly but less desirable, are common on budget-priced tents. Be sure they're sewed with the flap downward

THE SIZE AND STYLE of the tent you buy will depend on the number of persons who'll be sleeping in it and the time you'll spend inside while awake. Figure a clear floor area of at least $2\frac{1}{2}$ by $6\frac{1}{2}$ feet per person, and add 50 percent to that figure if you'll be sleeping on cots. And remember that you'll want some room left between sleepers for getting in and out while others sleep.

Height of your tent is up to you. If you think you'll spend much waking time inside, you'll want a style with full headroom. But if the tent is only for sleeping, you can get along with a low-ceilinged model that's less expensive, lighter, and easier to pitch. Remember, though, that it'll be uncomfortable to sit in while waiting out a rainstorm.

The fabric in your tent is as important as its size and style, and your choice of materials will affect the tent's weight, water repellent qualities, mildew resistance, life expectancy, care and maintenance, and, most important, cost. As with most consumer goods, the most desirable materials cost the most, and give the best service, but if your needs are simple, you can get along nicely with less expensive fabric.

Tents



WATCH STRESS POINTS closely, especially where guy ropes attach. Look for backing and strong grommets or rings; avoid tapes



HEAVY LINES and big slides, bottom, don't do any better than light nylon lines and small slides which are lighter and easier to handle

Tent fabrics are rated by weight and thread count. A "six-ounce fabric with a thread count of 130" means that a square yard of the material weighs six ounces, and it has 130 threads to the square inch. Generally speaking, the higher the thread count and the lighter the weight, the better the material. Seven of the most popular fabrics are shown on page 144. They are:

1. **Suma cloth**, a two-ply twill; 5.5 ounces, 400 threads; an excellent light fabric that is "dry" water repellent (chemically treated like a rain-coat).

2. **Poplin**; 7.5 ounces, 160 threads; a good, durable single-ply fabric, also "dry" water repellent.

3. **Palina cloth**, rated with poplin.

4. **Drill**; 7.6 ounces, 130 threads; a sturdy, medium-priced fabric, oil treated for water and mildew repellence; adequate for occasional and vacation campers.

FIVE DIFFERENT STYLES



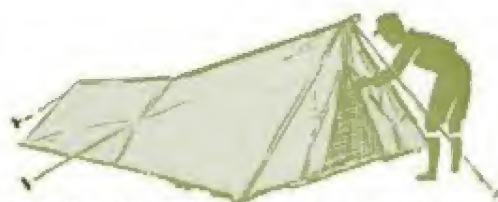
UMBRELLA STYLE gives good head and floor space; is easy to erect with frame



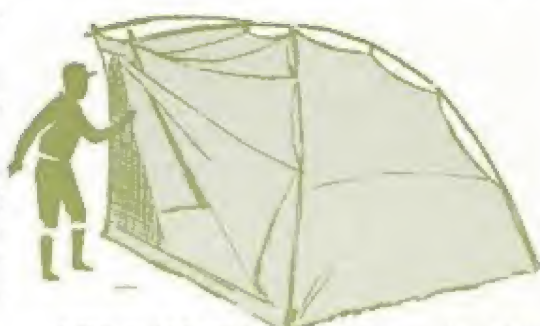
WALL STYLE is roomy but heavy and slow to erect; best for long stays in one camp



EXPLORER STYLE is light, easy to erect; has headroom at one end; needs no pole



MOUNTAIN STYLE is a refined "pup" type; ultra-light protection for two sleepers



NEW "SAFARI" STYLE uses stressed outside frame, no stakes, but is almost windproof

5. **Medium twill**; 5 ounces, 100 threads; a light, fairly coarse fabric, oil treated.

6. **Twill**; 5.5 ounces, 100 threads; a stiffer twill treated with both oil and wax for better water resistance.

7. **Army duck**, another two-ply fabric; 8.7 ounces, 180 threads; oil treated. Heavy and stiff, but good for tents to be pitched and left for a long time. Can weigh up to 13 ounces.

Watch the tags and literature, and don't hesitate to ask questions about the fabric in your tent. It makes a big difference.

Quality of construction goes hand in hand with quality of materials in a tent. Look for good, lap-felled seams, heavy stitching all around, and reinforcing at stress points like top ridges, front flaps, floor-wall seams, and reinforced metal grommets or rings where guy ropes and poles attach. Look for tight seams and joints and heavy-duty zippers.

If you live in a warm climate, be sure your tent has enough openings to give good ventilation. But make equally sure that the openings can be battened down for wet or cold weather. Flaps should overlap the opening by at least an inch; tents with a fly or awning should have separate door flaps to allow closing the front without dismantling the awning structure.

A sewed-in floor and mosquito door are always a good investment; the deluxe treated-nylon floors that come on the better tents are best. They're lighter and easier to fold and store than heavier, coated materials. And if you're concerned about insects (and who isn't?) be sure all the openings are tightly covered with netting with bugproof zipper closures.

On tents with sloping walls, the better models will have extra tie loops or rings on the sidewalls to allow the walls to be guyed out to give extra room inside on long stays.

Weight and pitching time of the tent are best judged by the man who will have to do the work, but be careful to keep size and weight to a minimum, especially if you're planning to carry the tent far. For back-packing or canoeing, 14 pounds is maximum;

experienced campers try to stay under eight pounds. But if you'll be camping out of a station wagon, weight and bulk are no great problem.

If you'll be pitching your tent in one spot for your two week vacation, there's nothing wrong with a tent that takes an hour to pitch or strike. But if you're likely to be moving daily, as on a driving-camping vacation, you'd better settle for a model that you can get up or down in a few minutes; some of the new external-frame models are ideal for that type of camping.

While accessories shouldn't be the key factor in your tent-buying decision, they're certainly something to think about. Every accessory you have to buy later is adding to the actual cost of your tent. Look for good metal stakes—aluminum if you're packing the tent very far—and lightweight, easy-to-handle lines and slides. Lightweight takedown or telescoping poles save time and weight; there are models that need no pole at all, again for back-packers.

A carrying case for the tent is not only a convenience, but will add to the life of the tent by minimizing damage and wear during storage and transportation. Be sure the poles and stakes have a carrying case—they should never be rolled up inside the tent.

Your choice of materials, conveniences and extra features will make all the difference in the price of your tent. For example, one company offers five tents in the same 5-by-7 or "pup" style, beginning with a basic oiled twill model for \$6.50, and working up through models at \$13.95, \$16.50, and \$17.50 to the deluxe model, with Suma cloth fabric, custom workmanship, double guys, nylon floor, external framework, steel stakes, and a window that opens from the inside—for \$36. It's still a 5-by-7 pup tent, but that deluxe model is the best you can buy, and with all its goodies, weighs two pounds less than the basic model.

Most tents are good—but some are better than others for your purpose. Shop carefully and get all you can for the price you can pay.

—Patrick K. Snook



LOOK FOR good flaps over netting-covered openings; best if they can be opened and closed from inside



ONLY ZIPPERS will keep bugs out around netting; should close bottom, too



LOOK FOR additional reinforcing strip on eaves and main corner seams, also on flaps and floor-wall seams

LOOK FOR reinforced backing and heavy webbed tape around areas where ropes and poles attach



DOOR FLAPS should overlap at least an inch and tie down for wind protection

GOOD VENTILATION demands tie-back flaps and at least one window in rear





KENYA GAME WARDEN D. H. McCabe cocks crossbow for a test. Weapon is quiet, accurate to 100 yards



AIMING for weak spot just below rhino's shoulder, McCabe brings the beast down with one shot, below



African Game Saved by a Crossbow

Working to save game trapped on islands formed by the filling of Lake Kariba in Africa, game wardens have developed a stunning technique using one of man's most ancient weapons, the crossbow. Rhinoceroses and other big, nervous and dangerous animals are cornered and shot with an

arrow tipped with a hypodermic needle. A hit drives the needle home and automatically injects a drug which anesthetizes even a big rhino in 15 minutes. The prostrate animal is given an antidote, then a tranquilizer, then moved by sledge and raft to the mainland, revived, and released.

Bees Set New Cotton Boll Records

Government scientists are using bees to pollinate cotton—and are producing larger crops per acre. Cotton is a self-pollinating plant, but cross-pollination with honeybees increases yields up to 80 percent, according to experimenters at the U. S. Department of Agriculture's Southwestern Bee Culture Lab in Tucson, Ariz.

Researchers keep track of the bees' work by marking them with quick-drying paint for individual study. In addition, they can determine the bees' range of pollination by using distinctive crinkle-leaf control plants that produce ordinary seeds if pollinated by a bee carrying pollen from an ordinary plant.



NUMBERING BEE as it feeds on sugar solution in artificial flower enables researchers to keep track of flights

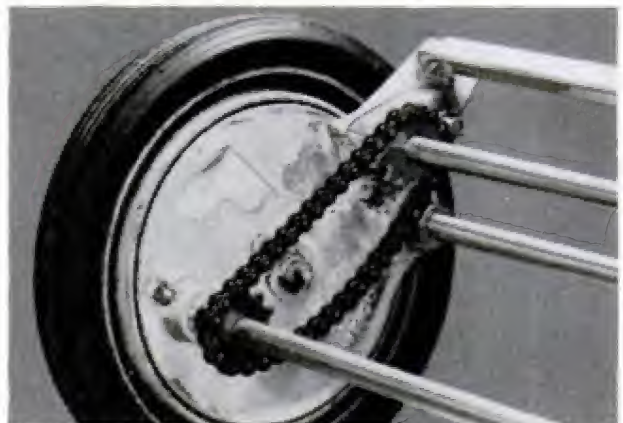
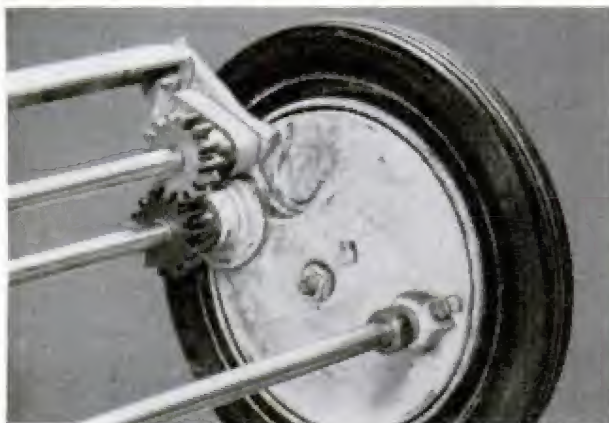
DOTTED WITH POLLEN, bee emerges from cotton flower. It will cross-pollinate other plants it visits next



CROSS SECTION of cotton flower, opening at 8 a.m. Bees can only cross-pollinate between 8 a.m. and noon

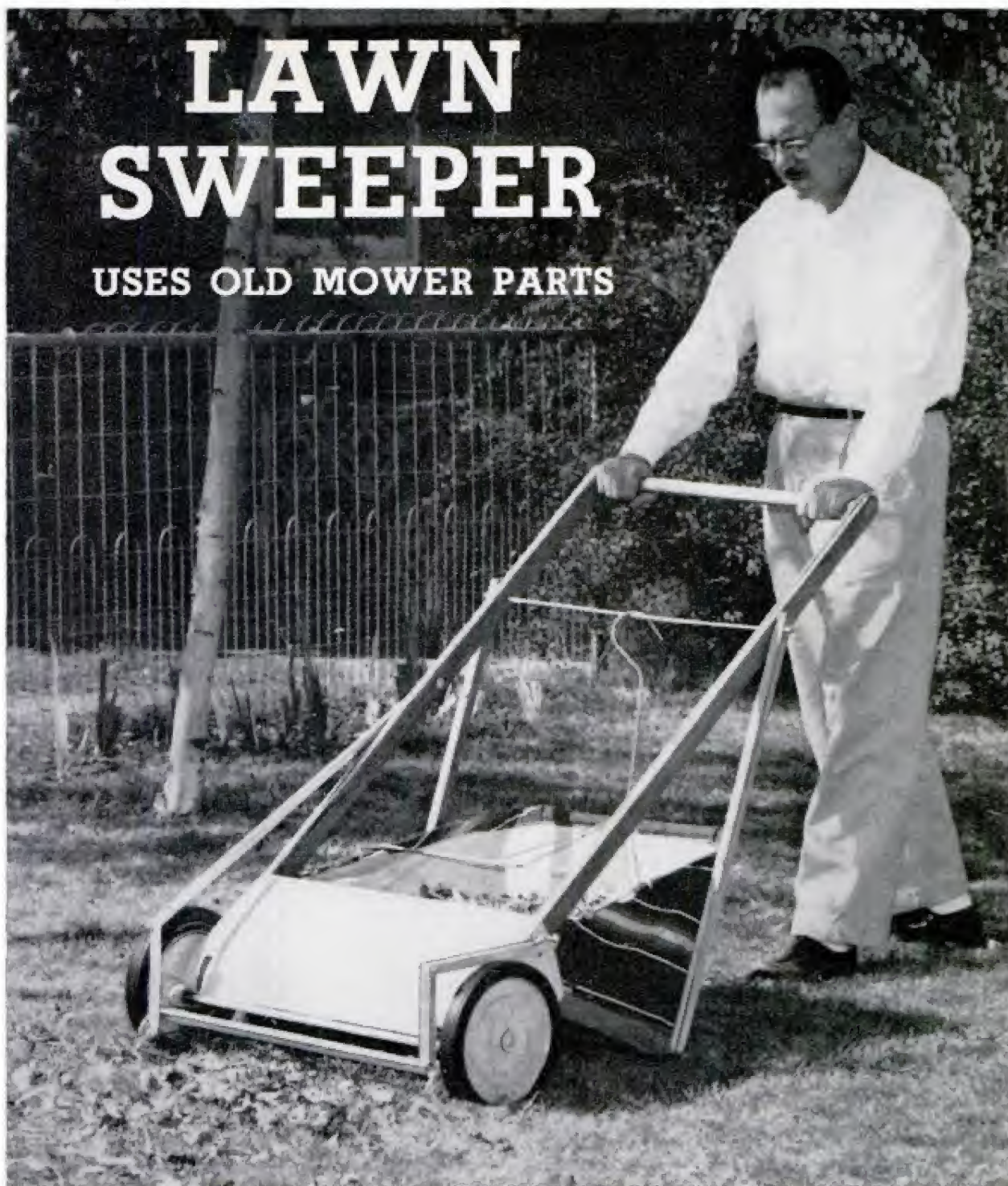


OPPOSITE MOWER WHEEL showing roller-chain drive to the brush shaft. This drive reverses brush rotation



LAWN SWEEPER

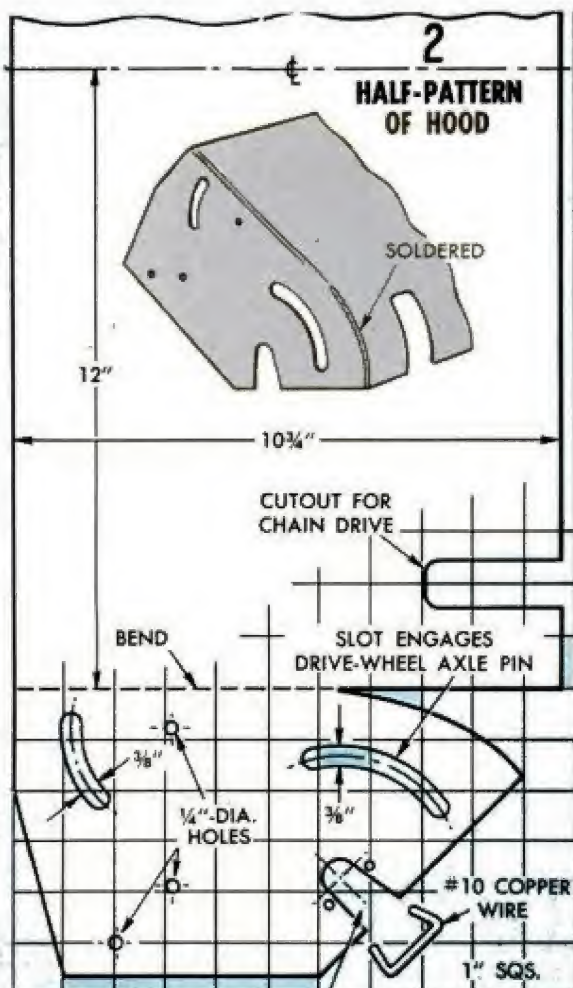
USES OLD MOWER PARTS



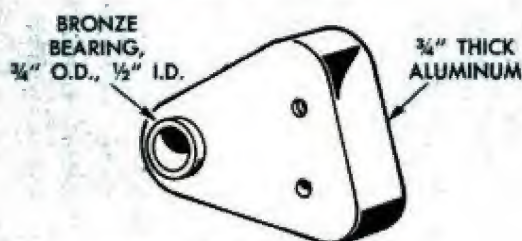
By Manly Banister

MAYBE YOU hadn't thought of it but the parts from that old hand mower you've been ready to toss out since you bought a new power mower can be used to make an excellent lawn sweeper. You dismantle the mower and throw away everything but the wheels, wheel plates (in older hand mowers these are castings) the pinions and clutch pins and the bolts and retainers that hold the wheels on the spindles, and in some cases the reel bearings. Clean these parts thoroughly in a solvent to remove accumulations of grime and lubricant.

The brush which picks up leaves and trash must run in a direction opposite to that of the grass-cutting reel. This is accomplished by reversing the normal position of the wheel plates and driving the brush through spur gears and a roller chain as in Figs. 1 and 3. The former detail of the assembly and the photos directly below on the opposite page show how the mower is altered and reassembled with a new drive shaft, a jackshaft, to give the brush shaft a reverse rotation to the direction of travel. The bosses on the wheel plates which nor-

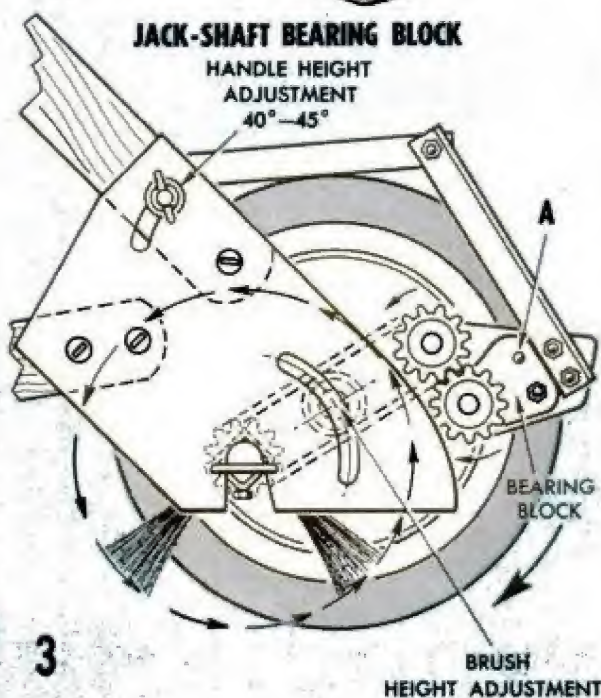


FITS OVER
BRUSH-SHAFT BEARING



JACK-SHAFT BEARING BLOCK

HANDLE HEIGHT
ADJUSTMENT
40°-45°



ALUMINUM ANGLES which hold brush sections in place are notched on table saw. Note backing strip

mally take the ends of the shrub bar are utilized as seats for bronze sleeve bearings in which the brush shaft rotates.

Now, from the mower you use you will have to determine the diameter of the drive shaft and the brush shaft. Of course, these are longer than the originals, that is, if the original mower was, say, a 16-in. cut, you can open it out to 24 in. or slightly more in sweeper width, and the 18-in. mower in proportion. The jackshaft can be $\frac{1}{2}$ in. diameter as in Fig. 1. But the diameters of the other two shafts will be governed by the size of the sleeve bushings you can seat (by reaming) in the shrub-bar bosses and also by what size bushing can be seated in the drive-shaft bores. On some old mowers the reel is carried on self-aligning ball bearings and it may be that these can be utilized in the conversion. The clutch mechanism of the mower is retained; only the shaft is replaced by a longer one.

Note closely in Fig. 1, the photos below Fig. 1, and also the detail A, Fig. 3, that the jackshaft is carried in pivoting bearing blocks. In the first stage of the assembly these blocks are attached with only one bolt through the mower plates. This permits you to adjust the spur gears for proper running clearance. Once this has been determined—with all parts in position in a trial assembly—the blocks and plates are drilled and tapped for small capscrews, labeled A in Fig. 3. The spur gears were taken from an old mower, the clutch collars, or hubs, machined flush and the body of each drilled between adjacent teeth and tapped for a hollow setscrew. Normally, these gears are $1\frac{1}{2}$ to $1\frac{3}{4}$ in. in diameter, an average being $1\frac{5}{8}$ in. Of course, any pair of spur gears near these sizes can be used. Chain sprockets are $\frac{3}{8}$ -in pitch, $1\frac{5}{8}$ in. total diameter and have 11 teeth.

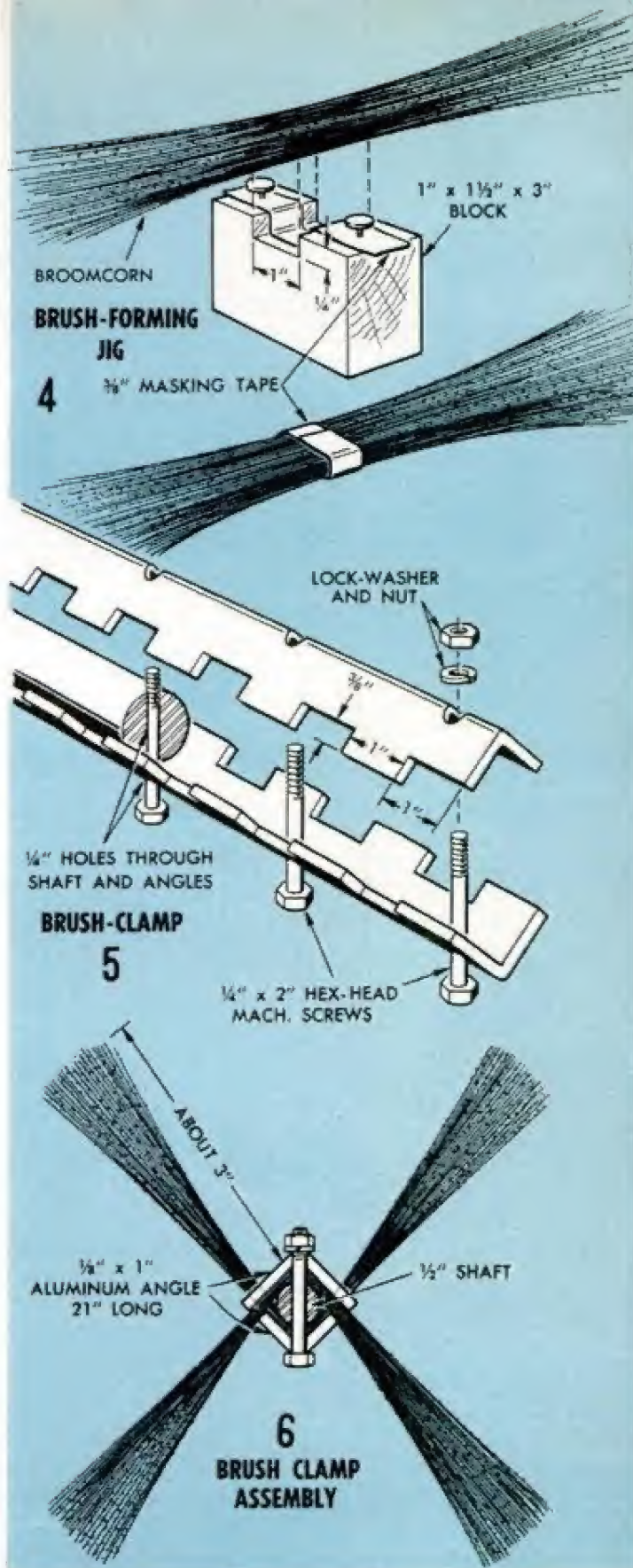
Next you make the hood, or brush housing. Fig. 2 shows the development of one half of the hood from a center line and



BROOM STRAWS are bundled in jig, then taped and sewed. Keep bundles as nearly uniform as possible

indicates where and how to bend the metal to obtain the necessary shape. Mowers differ in construction so before you make the cuts and slots indicated, run a check on all parts of the assembly, just to make sure you get them properly located. Don't solder, slot, cut, or drill holes until you're sure of location. Note the relationship of parts in Fig. 3, also the positions they assume when the unit is in operation. Compare also with the pulled-apart detail, Fig. 1. You might also correlate these views with the photo of the finished sweeper on page 151. The adjusting bar, Fig. 1, raises and lowers the brush, the assembly pivoting on the wheel retaining pin. In some mowers this is a bolt and in this case the hex nut can be replaced with a wing nut which is more easily loosened when adjustment is made. Note also in Fig. 3 that when assembled the tips of the four-section brush are trimmed so that they just clear the hood. The clearance can be $\frac{1}{16}$ to $\frac{1}{8}$ in. but no more for leaf sweeping. For some mowers you may have to make a full-size drawing of one wheel and wheel plate in order to determine the locations of the bearing and axle center. By projecting the shape of the hood on the drawing you can then determine the clearances needed for gears, bearing bosses and locations of the brush shaft and wheel-spindle slots.

The length of the brush is determined by the distance between the wheel plates (unit assembled) less the space on the brush shaft required for the two shaft collars and the sprocket. For leaf sweeping and ordinary lawn grooming regular broom straws will do for the brush sections. If there's a broom factory near you then your supply problem is solved. If not, the straws from a couple of old brooms will do. To make the individual brushes you first make a jig, Fig. 4. Then clamp the jig



ONLY WHEELS and wheel plates of original mower are used, as pictured at the left. Below, partially assembled brush with all bundles in place ready for placing the second angle which forms complete hub





TRUE UP dolly, or trailer, wheel treads on belt sander. Hex-head machine bolts serve as wheel spindles

in a vise, lay a 3-in. length of $\frac{3}{8}$ -in. tape across the groove and thumbtack the ends. Then make uniform bundles of broom straws by pressing them tightly into the groove as in the photo at the left of Fig. 4 and taping them tightly together as indicated. Sew each bundle of broom straws along the center line of the tape, using a heavy linen thread and a backstitch. The purpose of taping is to hold the bundle in shape for sewing; the sewing holds it in shape until it can be clamped in the hub.

The brush hub, or holder, is made as in Figs. 5 and 6. Notches are cut in both webs of each of the two aluminum angles, each notch $\frac{3}{8}$ in. deep and offset 1 in. Notching can be done on a table saw as in the photo on page 152. Place the angles over the brush shaft (it should be removed from the assembly, of course) and drill $\frac{1}{4}$ -in. holes through both angles and the shaft for hex-head bolts, the holes equally spaced.

Bundles of broom straw won't take the bend required without breaking, so you coat them lightly with No. 10 motor oil and place them in the kitchen-range oven at about 250 degrees for an hour or so. The

HOLD WOOD PARTS against sheet-metal parts and drill through both. Method locates holes accurately



MUCH OF THE WORK of cutting out sheet-metal hood can be done on jigsaw with metal-cutting blade

heat drives the oil into the straws, making the bundles sufficiently flexible to take the bend. Hex-head machine bolts, $\frac{1}{4} \times 2$ in., are about the right length to draw the brush assembly tight, but in the first step in assembly you'll need two longer $\frac{1}{4}$ -in. bolts at the ends of the steel angles so you can draw the angles down sufficiently to permit use of one shorter bolt at the center of the assembly. Once the shorter 2-in. bolt is in place and drawn down, the two longer bolts at the ends can be removed and the 2-in. bolts substituted.

The brush is a little tricky to assemble but perhaps the best way to go about it is to attach the end of one angle loosely to the shaft with one of the longer bolts. Then support the ends of the shaft on blocks (or wooden V-blocks) and place one row of brush bundles, pulling each one under the shaft and pressing into the notches in the angle. Lay the alternate bundles on top of the shaft and the assembly will appear as in the lower right-hand photo on page 153. Now, place the second angle, insert the bolts at the ends and draw down the nuts

(Continued to page 212)

UNDERSIDE VIEW of the finished sweeper showing trailing dolly that supports the hopper and push bar





Block Wall Has Built-In Shadow Pattern

When you plan to use concrete blocks for a patio wall, keep in mind the usual shadow patterns that can be obtained simply by offsetting alternate blocks. A three-dimensional pattern is possible with as little as $\frac{1}{2}$ in. of offset per block. The pattern in the wall pictured above was made by offsetting, or corbeling, alternate blocks as each course was laid.

Such a wall can be made even more attractive by judicious use of colored ma-

sonry paints. The color, or colors, can be selected to match the house or provide a colorful background for shrubbery or flowers. With a pattern already built into the wall the surface offers much greater flexibility in the use of color. For example, on alternate sections of the wall the offset blocks can be painted one color and the rest of the blocks a second harmonizing color. Or, paint the wall one color, as you choose.

—John M. White

Cotton Swabs Sub for Paintbrush

Some small touch-up jobs around the home seem almost too minor to bother dipping a paintbrush. The next time you run into a chipped window sash or scratched table leg, forget about the brush and try using a cotton swab, such as a Q-Tip. These throwaways from the nursery are fine for dabbing a drop of paint over a small scratch or even touching up painted toys. Even on big jobs, a cotton swab will come in handy for reaching those hard-to-get corners and recesses which defy most brushes.

Many hand sprayers have small glass jars with threads which correspond to those of quart jars containing mayonnaise or other food products. These larger jars make excellent substitutes for the regular jar if you slip a short length of rubber tubing over the intake tube of the sprayer so that it reaches to the bottom of the container. You can store spray liquids the year round in the same container and simply substitute jars when you wish to use a different spray.—James V. Huffman





1. FRAME AND AXLES are constructed of steel tubing, both square and round. Motor is mounted in the rear



2. CHAIN DRIVE transmits power from the motor to the large sprocket mounted inside the right rear wheel

3. BRAKE DRUM bolts to inside of left rear wheel, and brake shoe assembly is mounted on the axle itself

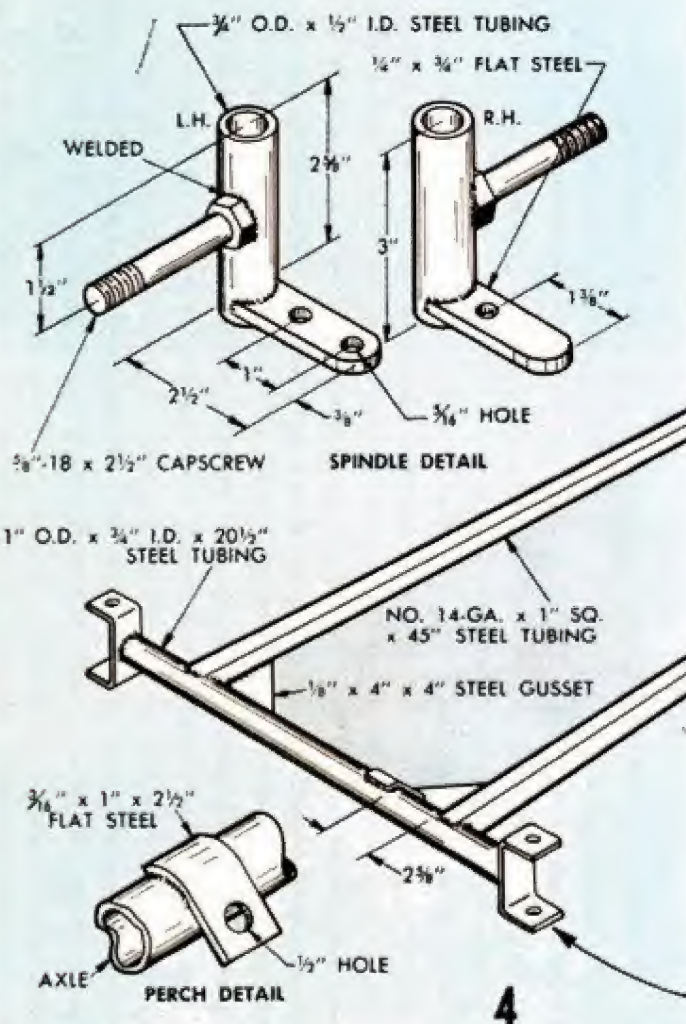


Safe Electric

JUST ABOUT THE sharpest little sidewalk car you've ever set eyes on—that's this approximate half-scale replica of an old-time open touring car. It's powered by a 12-volt battery and can buzz around the neighborhood with a full load of passengers—moppet size—all day on one charge. Has everything, headlights, taillights, internal expanding brakes, forward and reverse gear and a loud klaxon to warn people in plenty of time. Top speed is a safe seven miles per hour which should hold Junior until he graduates from the sidewalk set.

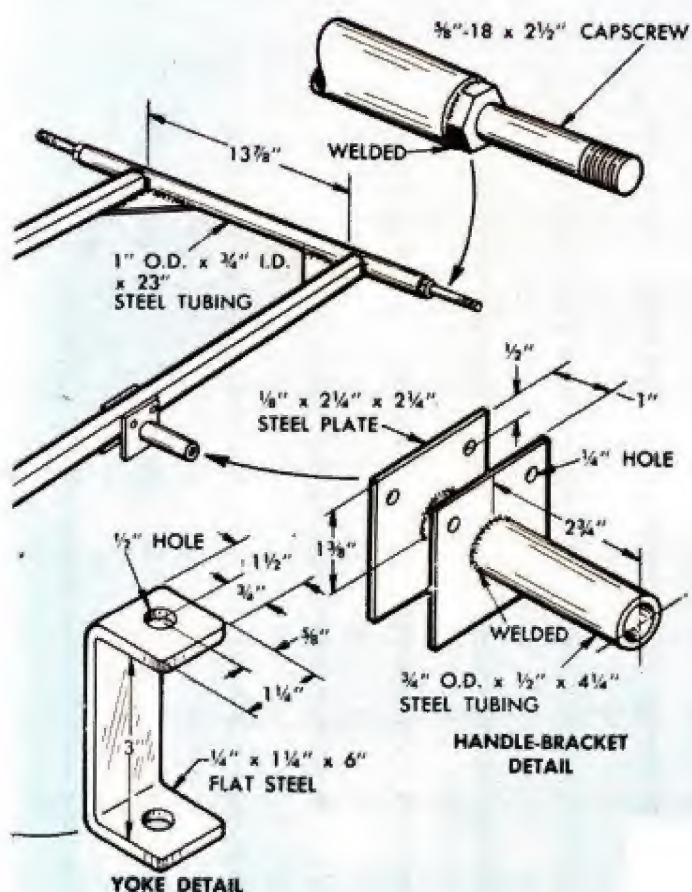
You can buy the little car complete, ready to run, or you can purchase the hard-to-make parts with motor and take it from there yourself, making the sheet-metal seats from stock materials and assembling the running gear. This way it makes the perfect father-son project.

The units require a minimum of welding, and the subassemblies can be joined with spotwelds, rivets, or sheet-metal screws. Construction begins with the frame, Figs.



Touring Car

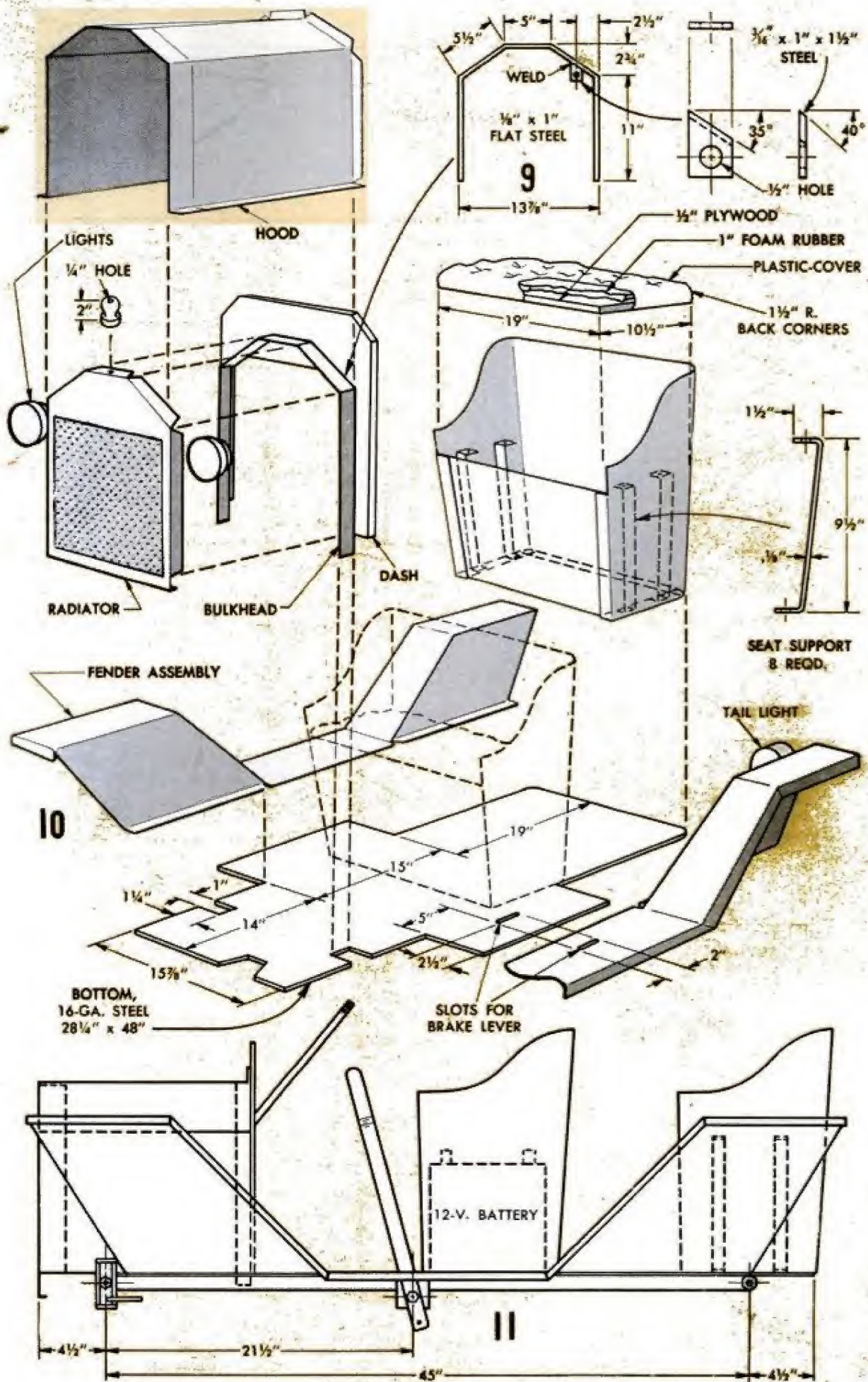
By George E. Jones

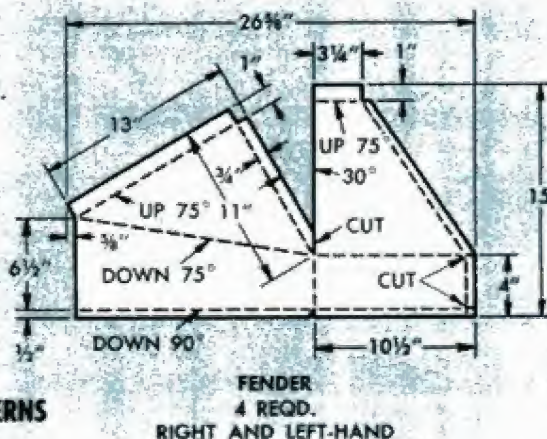
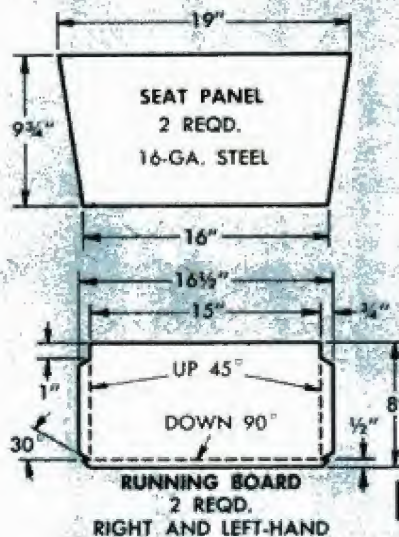
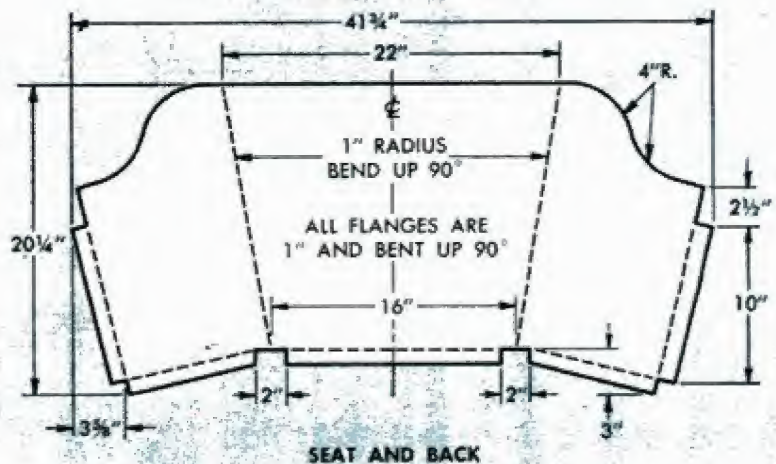
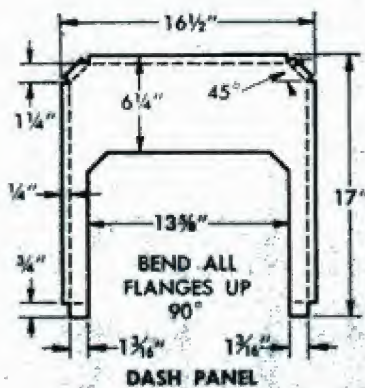
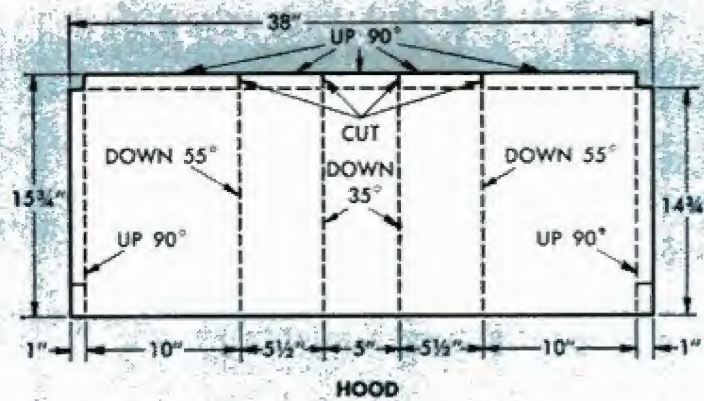
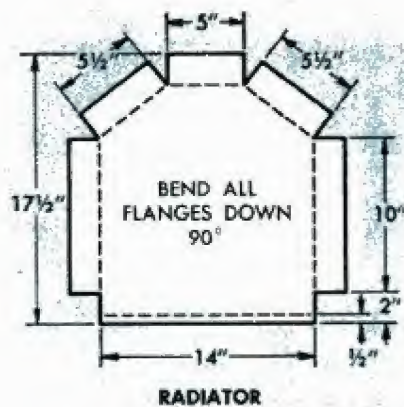


1 and 4, which is made from 14 ga. x 1-in.-square steel tubing. Cut the two side rails to length and file curved notches in the ends for the tubular axles. To make the front axle, cut spindle yokes to length, bend them to the correct shape in a vise and drill holes for 1/2-in. king bolts in the ends. Then cut the axle from 1-in. steel tubing and weld the yokes to it so they are centered on the ends, parallel to each other.

5. **READY TO ROLL**, the half-size touring car will appeal to even most modern, space-minded youngster







12 BODY PATTERNS

Weld the front axle in the notches on the ends of the side rails with the yokes at a 90-deg. angle to the side rails. After cutting the steering perch, Fig. 4, drill a 1/2-in. hole in it and weld it to the axle. The rear axle is made by butt-welding capscrews to the ends of 1-in. steel tubing. Weld this in the side-rail notches and complete the frame by welding a gusset in each corner.

To make the front-wheel spindle assemblies, Fig. 4, first drill and mount the arms, then weld capscrews to the tubular bodies at a 90-deg. angle to the arms. Assemble the brake handle bracket, Fig. 4, and mount it on the left frame rail.

Now is a good time to cut all rods to length and thread them. Weld the pitman arm to the steering shaft, Fig. 8, and as-

semble the ball joints on the tie rod and drag link. Bolt the ball joints to the spindle arms and complete the sprocket coupling, then clean the frame and give it one coat each of metal primer and flat black enamel. When the frame has dried, mount the front wheels with castle nuts held in place with 1-in. cotter pins. The wheels will revolve freely if you back the nuts off 1/4 turn from the snug position.

Adjust the ball joints for about 1/16-in. toe-in and tap the hub caps in place. The brake drum, Fig. 3, is bolted on the left rear wheel, and the brake shoe assembly is mounted on the axle itself with setscrews. Snug up the wheel with a castle nut held in place with a cotter pin, and add the hub.

(Continued to page 226)

Solving HOME PROBLEMS



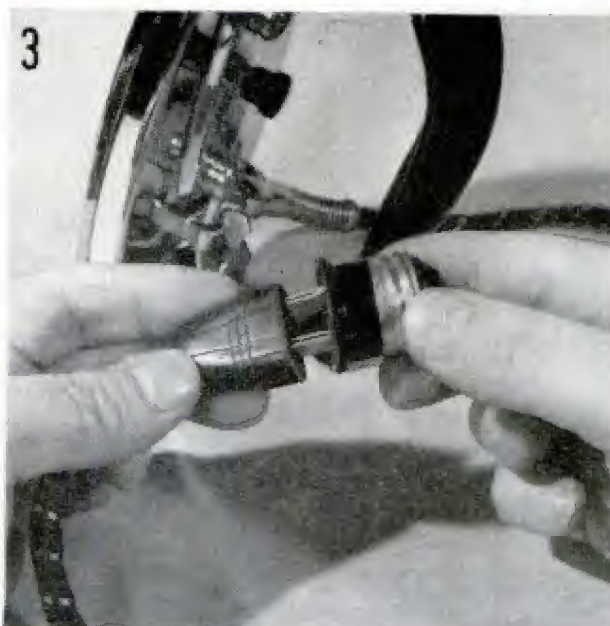
1. STEP-SAVING RACK slips over the end of your ironing board and holds a number of freshly ironed shirts or blouses on their hangers. Make it from $\frac{1}{2}$ x 1-in. stock and $\frac{3}{8}$ -in. dowels, mounting the short dowel braces about $3\frac{1}{2}$ in. above the lower cross member. The side pieces should be approximately 2 ft. long

2. REMOVABLE SHELVES are easily installed between the exposed studs of your garage or workshop if you use short sections of discarded flat curtain rod as shelf slides. Tack the sections of curtain rod to the studs, making sure that they are level, and slide $\frac{1}{4}$ -in. or $\frac{3}{8}$ -in. plywood shelves into the grooves



3. ELECTRICAL APPLIANCE cords often trail loosely on the floor when the appliance is not in use. Each time the plug is accidentally stepped on there is a risk of damaging the prongs and increasing the danger of short circuits. To protect plug, slip the prongs into an older-type threaded connector.

4. SCRUB BRUSHES are made from very hard wood, and their sharp edges often mar woodwork and furniture. To prevent such damage, drive rubber-headed tacks near the ends or corners of the brush to act as bumpers. The tacks will be easier to drive if you first drill slightly undersized pilot holes for them



SOLVING HOME PROBLEMS



5. DISCARDED DRAWER can be converted to a useful shelf unit simply by standing the drawer on end and adding one or more shelves. Mount the shelves by nailing into them through the sides of the drawer

7. CHILDREN'S SHOELACES receive hard wear, and the metal tips on the ends are soon either damaged or lost. The next time you have to thread one of these tipless laces, use bobby pin as a threading needle



9. CHILDPROOF A DRAWER by installing an elbow catch on the inside of the front panel and a matching striker on the underside of the center guide. Drill a 1-in. hole in the front about 2 in. below catch



6



6. BICYCLE PEDALS will wear much longer and require less maintenance if you pack a small, oil-soaked piece of cloth into the cap to lubricate the shaft and prevent dirt from working its way into the bearings

8. JAR OPENERS have always been popular kitchen tools, and here's a Y-shaped plywood model you can make for the purpose. Line the inside of the legs with emery cloth to provide a rough surface for gripping



10. TRANSPLANTING can be accomplished without disturbing the delicate root system if you line the starting container with a plastic bag. Don't forget to punch a few drainage holes in the bottom of bag



ANIMATED EASTER EGG



By Willard and Elma Waltner

YOUNGSTERS WILL BE sure that they are special friends of the Easter Bunny when they discover this thrilling surprise egg on Easter morning. Long an old-world favorite, the originals were made by constructing tiny scenes inside real egg shells. This giant-sized version is formed of papier-maché over a balloon, and contains an animated scene with three bunnies chasing each other in and out of their house. The viewer makes it work by a concealed crank which is turned by pushing a dowel handle in and out.

Begin by preparing a creamy flour paste and a quantity of irregular paper strips. Any kind of paper will do, but since the strips are applied in layers they should differ in appearance so that you can tell at a glance when one layer is complete.

Blow up the balloon until it is about 20 in. in circumference and tie the stem. At this size, it will be egg-shaped instead of round. Next brush paste on one side of the paper strips and cover the balloon with a single layer of paper, leaving a 2-in. circle around the stem for the viewing hole and a 4-in. hole at the top to admit light. Continue building up the shell until at least six layers of paper have been applied, then brush a coating of paste over the last layer and put the balloon aside to dry for a day or two. Once the shell has dried, you can deflate the balloon and pull it out.

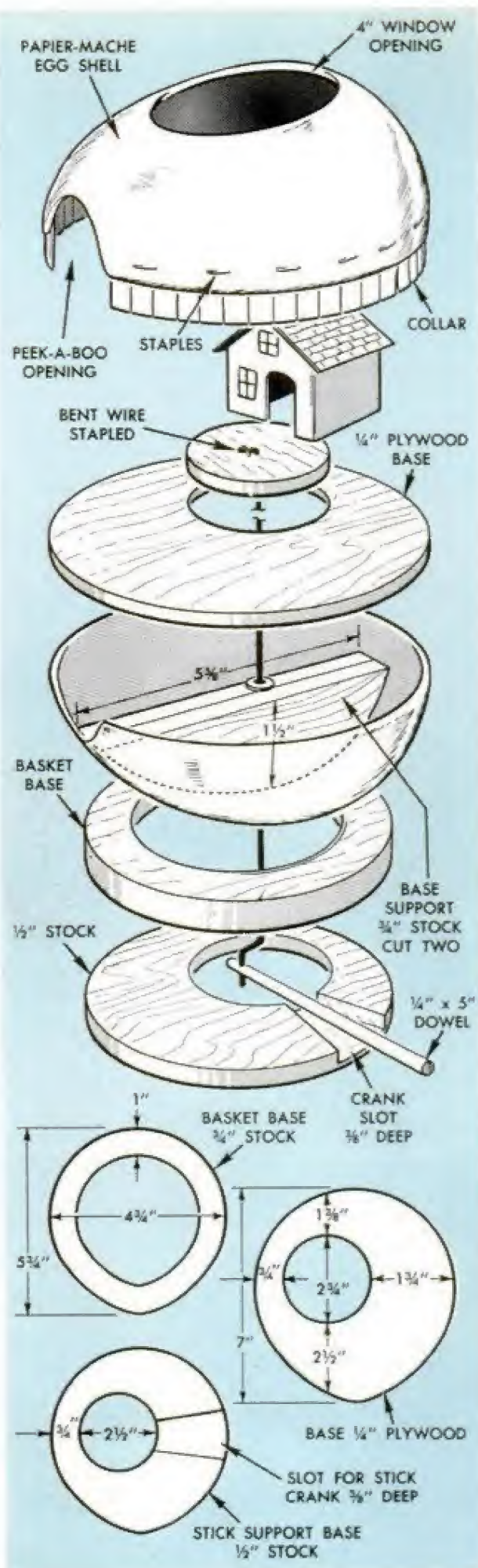
Before cutting the shell in half, trim the edges of the two openings to make them even. Cut the shell lengthwise, beginning



COVER THE BALLOON with strips of paper coated with paste, but leave openings at top and around stem

IN AND OUT they race, and the delighted viewer can control the speed of the rabbits as he turns the crank





at one edge of the viewing hole and cutting all the way around to the opposite edge of this opening. Make sure that the 4-in. window is centered in the top half of the shell. To make the collar which holds the two halves in position, cut a $\frac{1}{2}$ -in. strip of posterboard long enough to fit around the inside of the egg and make $\frac{1}{4}$ -in. slashes in this strip at $\frac{1}{4}$ -in. intervals. Glue and staple this collar inside the edge of the upper half of the shell. Because of the forming method used, the dimensions and shape of each shell will vary slightly from those given in the diagram. Be sure that you shape the base, base support, basket base, etc., to fit your particular shell.

The base support which is mounted inside the bottom half of the shell is made by cutting two pieces of $\frac{3}{4}$ -in. stock to fit the curve of the shell and nailing them together. For a closer fit, bevel the outer edges of the support slightly. Before fastening the support in place, cut the $\frac{1}{4}$ -in. plywood base to the approximate shape and dimensions given in the diagram, and locate a $2\frac{3}{4}$ -in. circle as shown. When cutting out this circle use a coarse blade so that the saw kerf will be wide enough to permit the disk to turn freely inside the hole.

Drill a hole in the center of the disk large enough for a coat-hanger wire, then cut a 4-in. length of the wire, bend one end to a right angle and slip the wire through the hole. Use a staple to fasten the short bent portion of the wire to the disk. Now place the base on the base support in the bottom of the shell and locate the point where the wire axle of the small disk should pass through the support. Drill a hole through the support at this point, making it slightly oversize to allow the axle to turn freely. Once this hole has been drilled, you may glue the base and its support in place.

(Continued to page 206)

BASE SUPPORT is made of two pieces of $\frac{3}{4}$ -in. stock cut and beveled to fit the curvature of the egg shell





ROTATING DISK is connected to dowel crank by a length of heavy wire which passes through the support



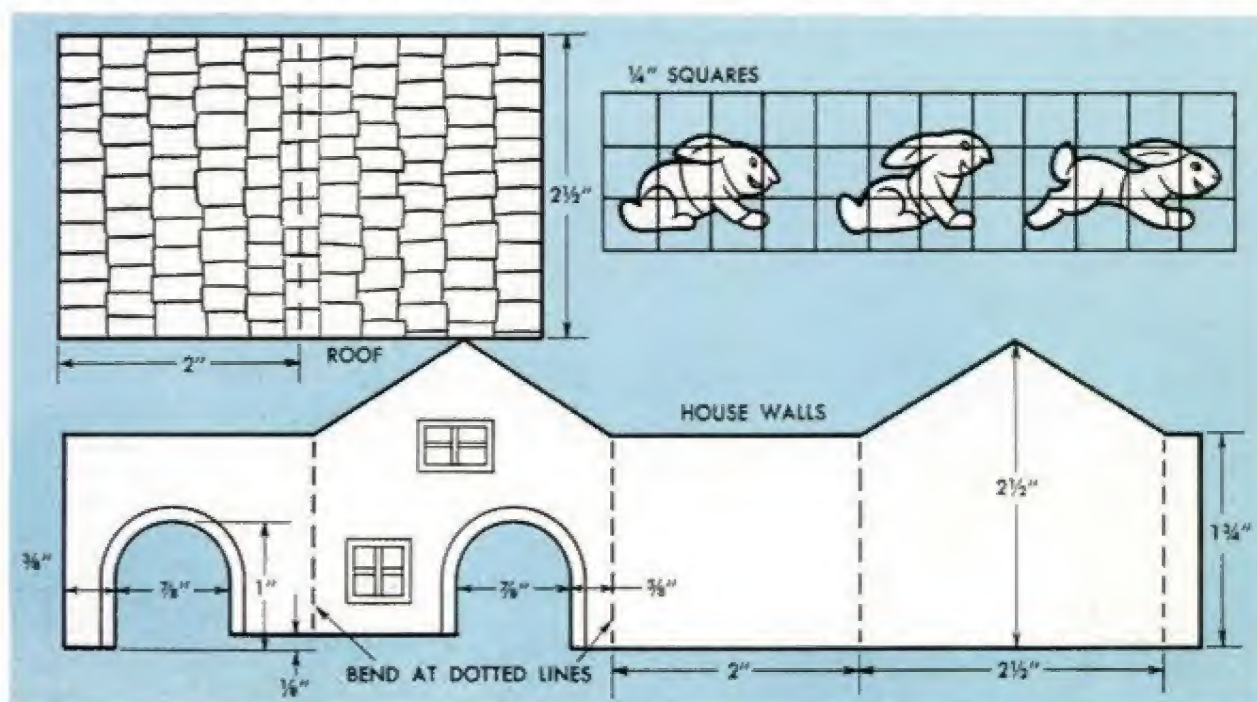
PAPER COLLAR attached to the inside edge of the top part of the shell helps align the two halves of egg



DOWEL CRANK has a hole drilled in one end to hold the bent end of the wire axle which turns the disk



DECORATIONS for the egg are limited only by the materials at hand and the amount of imagination used





PILOT HOME has roof of colorful corrugated aluminum supported by 2 x 4 purlins nailed to rafters and spaced approx. 24 in. apart



START YOUR VACATION HOME *at Home*

PART III

NOW THAT the floor sections and the exterior and interior walls of your PM vacation home have been prefabricated, there's little else you can do at home to save time at the building site. While the rafters could be precut, it is more advantageous from a standpoint of transportation to have the rafters, along with other dimensional lumber you'll need, delivered to the site from a nearby lumber dealer and make the plate and ridge cuts on the

POPULAR MECHANICS



WHILE YOUR FUTURE PLANS may not include the bedroom addition, you may someday plan to add the screened porch. Pouring the slab for it now will not only provide a patio you'll enjoy in the meantime but a dry landing outside the door to help keep mud out of the house. Here gravel fill is brought even with footing



HERE VERTICAL-GROOVE plywood of pilot home is being finished with two coats of redwood stain to contrast with white trim



BEFORE FOUNDATION is back-filled, concrete blocks should be waterproofed with asphalt coating. Below, stock panels of vented soffit board come ready for nailing to roof rafters



COMPLETE PLANS

including a material list, are available for the PM Vacation Home. Each set contains 14 sheets which detail the basic home as well as the add-on units. Floor alternates are included for the builder who may wish to follow conventional joist construction rather than pre-fabricating sections. The cost of the plans is \$20.00 for one set, \$35.00 for four sets. Each additional set is \$5.00 when ordered with the initial set. Order from Plans Department, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois.

job. The time saved in cutting them at home hardly would offset the problem of carting such long members (16 ft.) any great distance.

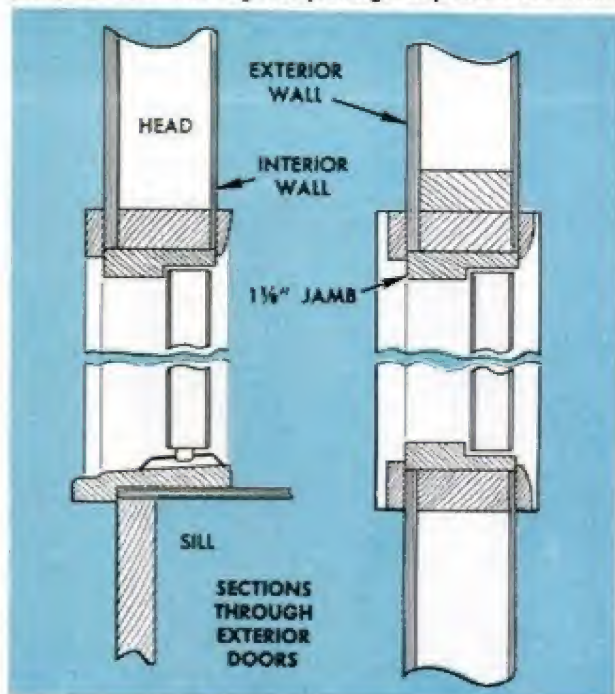
While waiting for the balmy days of spring, a thorough understanding of the general construction of the basic home will allow you to proceed without delay at the site. The sectional view from foundation to roof in Part II, plus accompanying details, will orient you on how the floor sections rest on 2 x 8 plates bolted to the foundation wall and on two laminated beams supported on piers in the crawl space. By hiring someone in the area to put the foundation in for you, you'll be way ahead timewise and can start setting beams and adding the plates the day you arrive. The sectional view also shows how the exterior wall sections hook over the floor sections and how the top of the walls are aligned and tied with a second top plate all around. You'll see how the lower edges of the wall sections are finished off with a drip cap and a 1 x 8 skirt board applied over tarpaper flashing. Also, how the overhang is finished off with a 1 x 8 fascia board, a 36-in. vented soffit board and a 1 x 3 trim board, plus quarter round.

A total of 26 rafters are required for the basic house, eight of which are used to form the rake, or overhang, panels at the gable ends. The rake panels can be made up as separate units assembled on the ground and raised in position, or they can be framed in place on the roof. The pattern for the rafters was given last month in

(Continued to page 214)



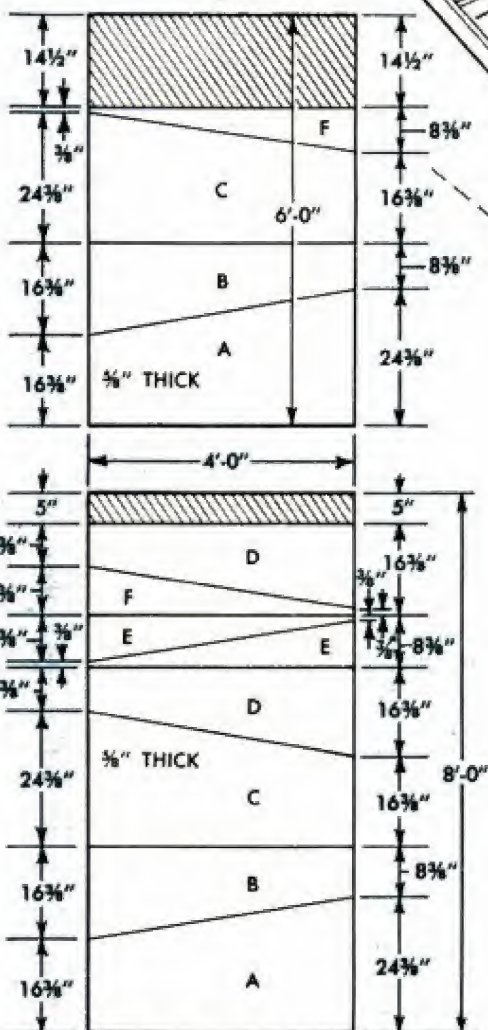
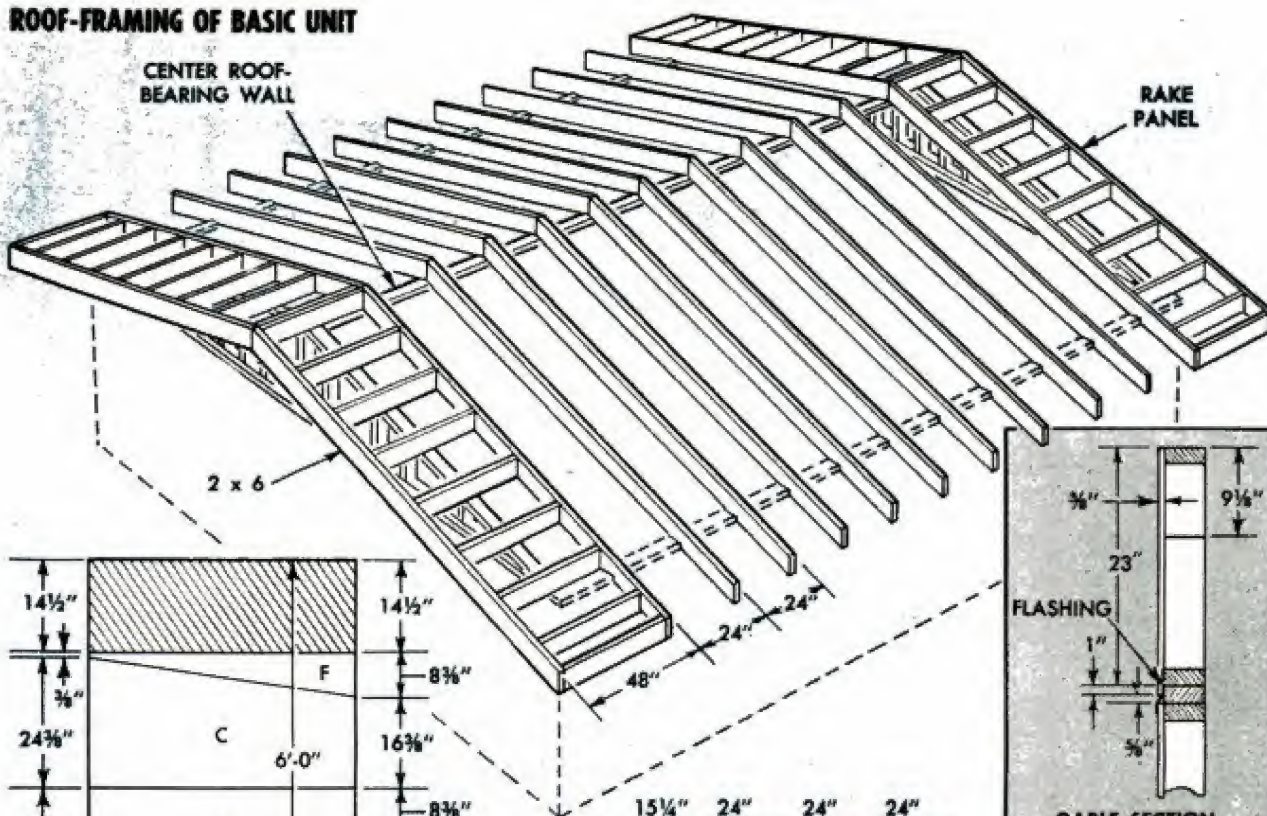
KNOCKDOWN WINDOW UNITS are assembled on the job prior to installing in openings in prefabricated walls



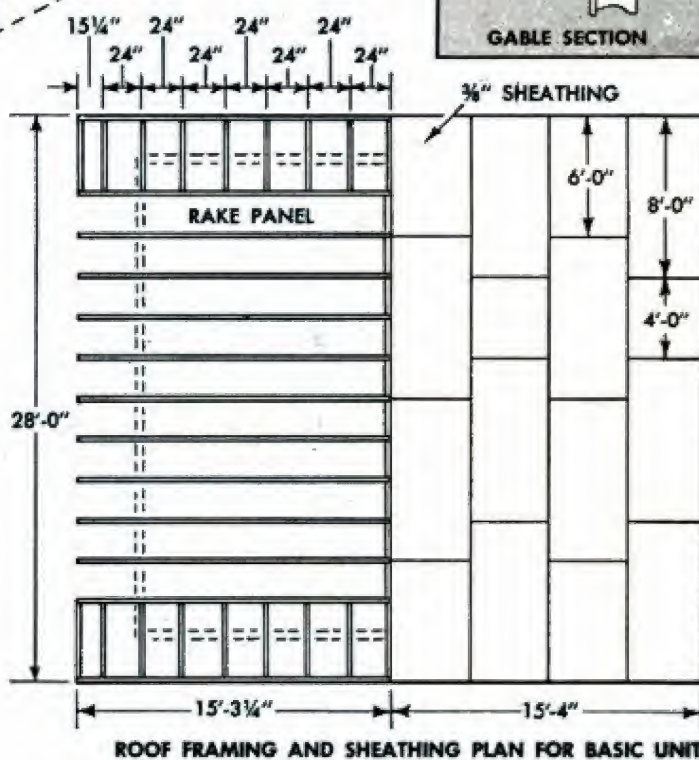
WHEN WIRING is in place in exterior walls, blanket insulation is installed and stapled to the studs



ROOF-FRAMING OF BASIC UNIT



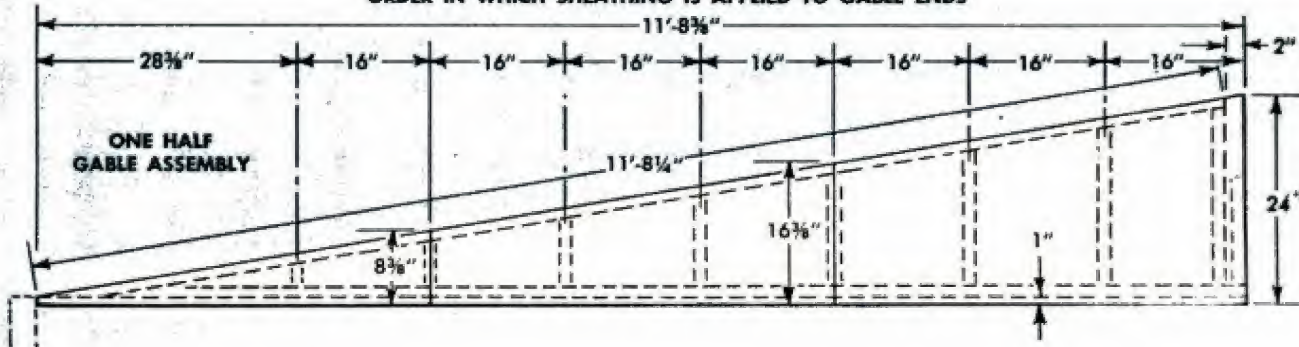
CUTTING PLAN FOR GABLE SHEATHING



ROOF FRAMING AND SHEATHING PLAN FOR BASIC UNIT



ORDER IN WHICH SHEATHING IS APPLIED TO GABLE ENDS





SOLAR HOT-DOG COOKER

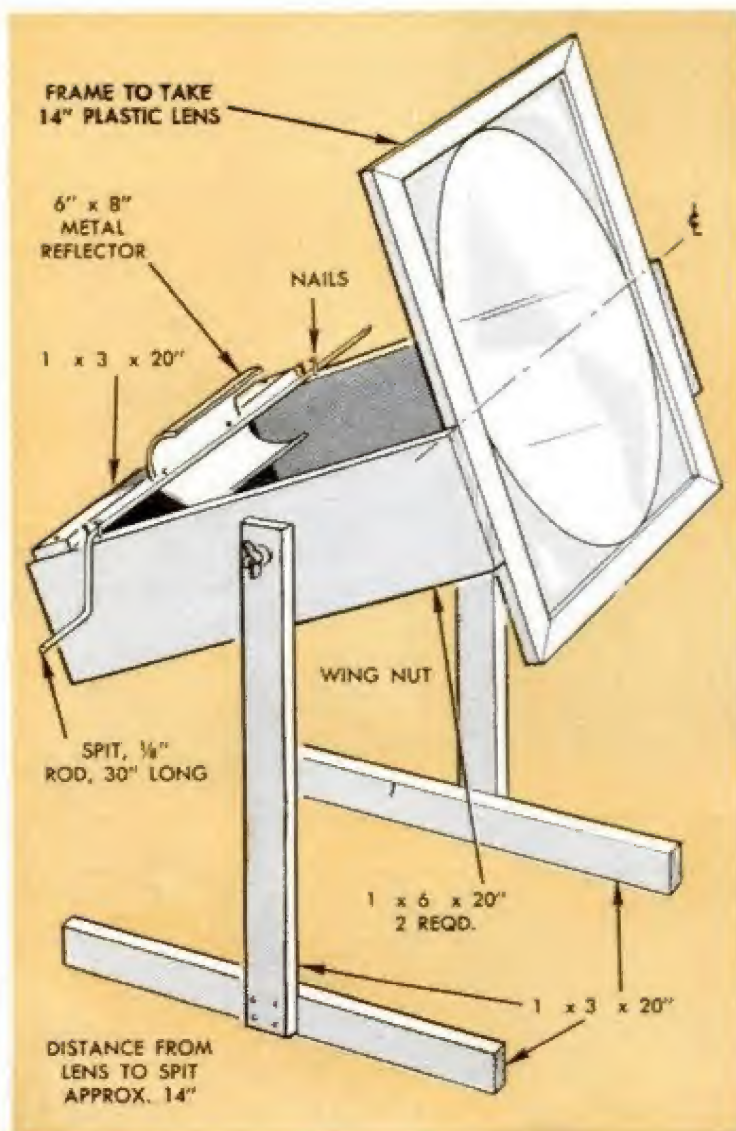
WHILE IT'S too small to keep up with the appetites of a hungry Cub Scout pack, this solar cooker is sure to be a successful conversation piece at your next backyard barbecue—even if there's snow on the ground! It costs less than \$10.

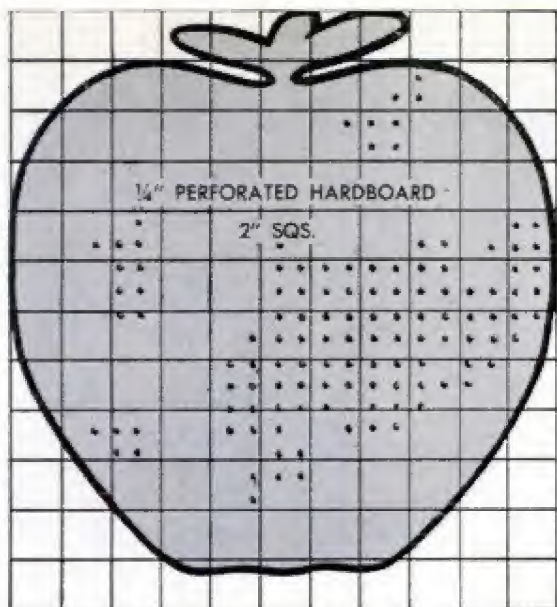
The cooker uses a 14-in.-dia. Fresnel flat plastic lens which can be purchased for about \$6. from Edmund Scientific Co., Barrington, N.J. The only other materials needed are a 6 x 8-in. sheet of aluminum, a 1/4-in. rod, two machine screws with wing nuts.

The two-piece frame for the lens should be approximately 14 in. square and is made by sandwiching the lens between two identical wooden frames mitered at the corners. The side pieces of the main frame are about 20 in. long. When attaching the lens frame, locate it so that the center of the lens is in line with the upper edge of the main frame as in the detail.

Form the reflector by rolling the sheet of aluminum into a half cylinder and nailing it to the reflector brace which will be mounted on the main frame later. To make the spit, bend a handle in one end of the metal rod and point the other end. Make the two legs and fasten them to the main frame with machine screws and wing nuts.

You'll need some sun and a hot dog to find the correct locations for the spit and reflector. Drive two small nails for the spit about 14 in. back from the surface of the lens, and temporarily mount the reflector base in such a position that the forward edges of the reflector are approximately in line with the spit. To make a test, aim the cooker at the sun, put a hot dog on the spit and see what happens. You may have to shift the spit or reflector so that the spot of focused sunlight is neither so large that it won't provide enough heat nor so small that it will burn a hole right through the hot dog. ★ ★ ★





An Apple for the Kitchen

Keeping kitchen tools handy is easy when they are hung within arm's reach on this big harvest apple. It's jigsawed from $\frac{1}{4}$ -in. perforated hardboard and is held out from the wall with a couple of $\frac{3}{4}$ -in. cleats

applied to the back so that regular wire hooks can be used in the holes. If you prefer, a regular hanging rack can be attached to the apple and used in addition to the wire hooks as shown.—J. G. Wisler

Hang It All

Picking bits of glass from countless screws, tacks, nails, etc. kept in jars stored on a shelf may make you eager to find another way of storing glass jars safely in your workshop. Some crafters fasten the jar covers to the overhead joists and screw the jars in them. This method has its drawback in that the jar is without a cover when making repairs outside the shop. A better way of storing the jars, and one which also conserves shelf space, is to attach regular metal corner brackets to the covers so they can be hung from nail hooks.

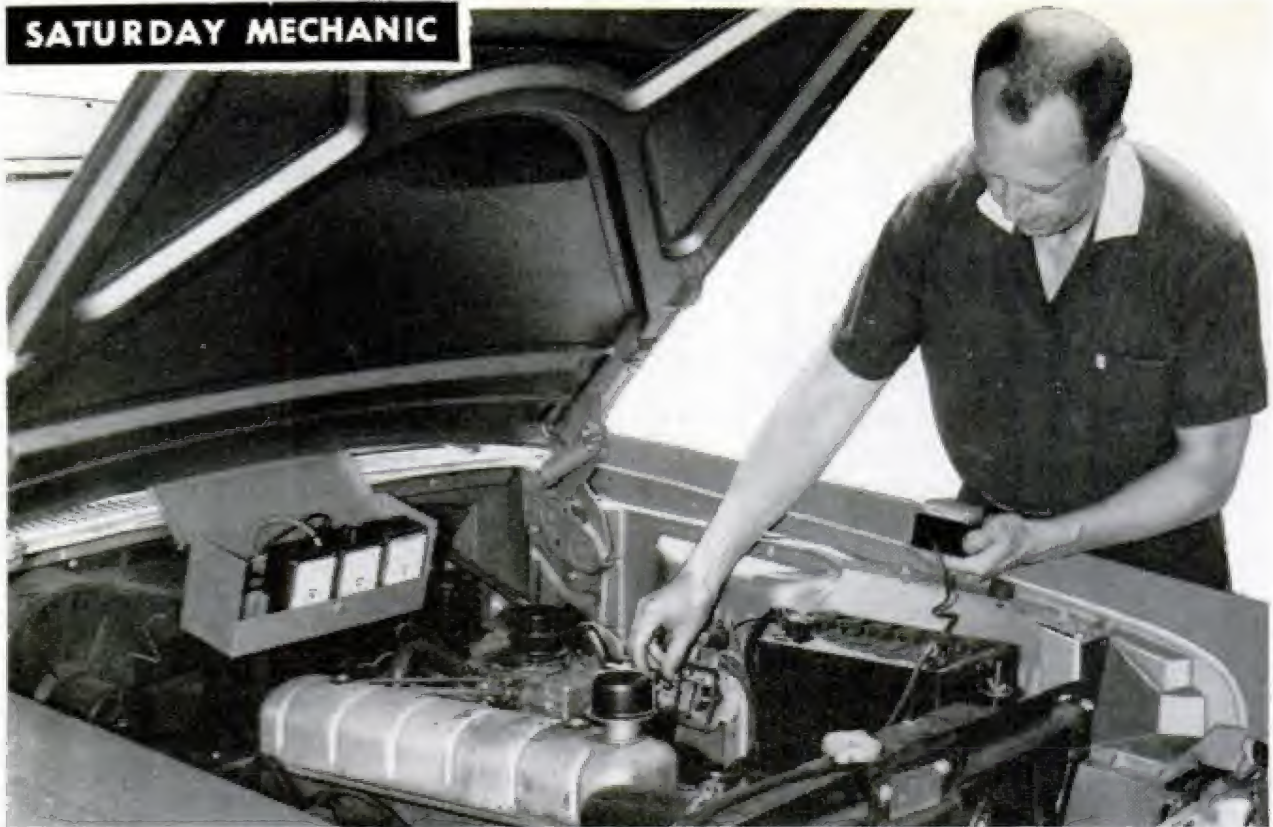


Gas Chamber for Moles

Want to rid your lawn of moles? Gas them with your power mower. Lawn-mower engineers at Minneapolis have found that the exhaust from gas-powered mowers will effectively put an end to their destructive burrowing habits. Simply attach a length of rubber hose to the mower exhaust, start the mower and insert the hose into the tunnel. The gas fumes will soon spread through the myriad of tunnels, quickly putting an end to Mr. Mole.

Next best thing to a projection stand is an adjustable ironing board. Provides ample table surface for slides, reels, etc.





1. TEST INSTRUMENTS should always be located within easy reach from any point about engine compartment

Regulator — Generator Checks

Keep the electrical system of your car at peak efficiency

By William J. Hector

BATTERY RUNNING DOWN more often than normal lately? Headlight bulbs burning out more frequently? If you must answer yes, then you have a warning that something is wrong with the generator-regulator system in your car. If you decide to take care of the chore of checking out the system yourself to localize the trouble, make a few simple visual checks first.

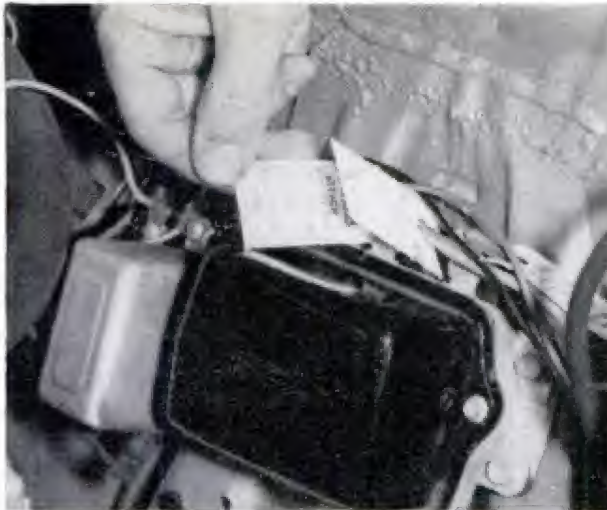
Press inward on the fan belt with your thumb at a point about halfway between the pulleys. Most manufacturer's instructions say that the belt should depress for about $\frac{3}{4}$ in. before tending to resist further movement. As a rule this indicates about the right amount of tension. If you get an inch or more flex in the belt, it may be slipping and this could be the cause of trouble. Tighten the belt to the recommended tension by loosening the bolt holding the generator on its mount and moving the generator back until the correct amount of belt tension is indicated, Fig. 13. Be sure to tighten the bolt.

On cars that have been in service for a year or more nearly every part in front of the fire wall takes on a coating of oil and

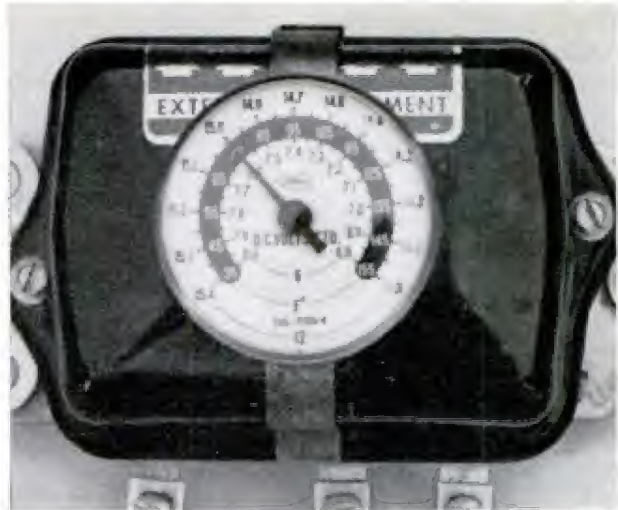
grease spatters, road grime and dust. This can even accumulate to the point where it forms a current path across terminals, or results in resistances, possible shorts and

2. BEFORE MAKING any tests polarize the generator and then be sure to observe polarity when testing





3. BEFORE TESTING tag each wire to be removed from terminals. Reconnecting incorrectly can cause damage



4. REGULATOR THERMOMETER indicates temperature and average setting for voltage limiter, or regulator

REGULATOR GENERATING AND STARTING SYSTEM

Current Rating (Amperes)	25	30*	Maximum Reverse Current to Open (Amperes)	8	8
Current Regulation (Amperes)	23-27	28-32*	Voltage Regulation at 75°F.	14.6-15.4	
Cut-In Voltage	12.4-13.2	12.0-12.8*	*R.P.O.		

VOLTAGE REGULATION SETTING VERSUS AMBIENT AIR TEMPERATURE

Ambient Temperature °F.	Voltage Regulation Setting (Volts)	Ambient Temperature °F.	Voltage Regulation Setting (Volts)
25	15.1-15.9	95	14.3-15.1
35	15.0-15.8	105	14.2-15.0
45	14.9-15.7	115	14.1-14.9
55	14.8-15.6	125	13.9-14.7
65	14.7-15.5	135	13.8-14.6
75	14.6-15.4	145	13.6-14.4

GENERATOR Part Number	Field Current Draw Amperes @ 12 v		Watts	Gen. rpm Charge Starts*	Maximum Rate		Pulley			Brushes		
	Hot	Cold			Amps.	Gen. rpm*	Drive Ratio	Belt Width (In.)	Pitch Diameter (Inches)	No.	Original Length (Inches)	Spring Tension (Oz.)
CODF-10000-C	1.2-1.8	1.7-2.0	375	1400	25	2450	2.00:1	3/4	2.7	2	0.86	32-40
CODF-10000-D	1.2-1.8	1.7-2.0	450	1300	30	2550	2.00:1	3/4	2.7	2	0.86	32-40

External Circuit Resistance (generator armature terminal to battery positive terminal): 0.6 Volt Maximum @ 25 Amperes). Maximum Commutator Runout: 0.002 inch.

STARTER MOTOR

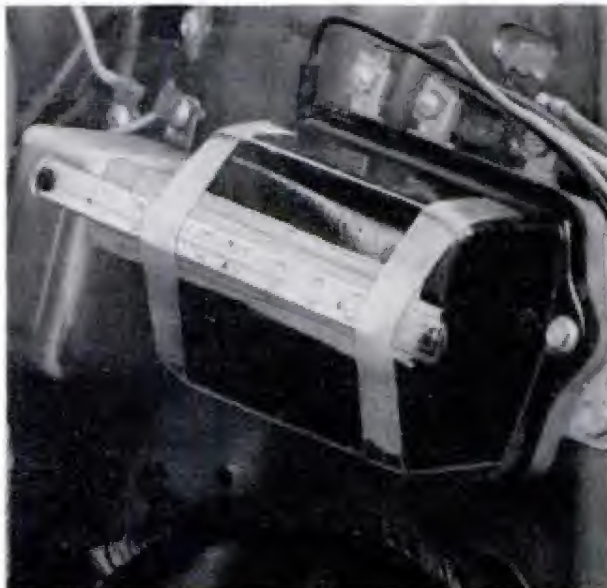
Normal Engine Cranking rpm	Min. Torque @ 5 Volts		Maximum Commutator Runout (Inches)	No Load Amperage @ 12 v
	Fl. Pounds (Min.)	Amp. Load (Max.)		
250-290	15.5	670	0.002	70

Current Draw under load (Engine at operating temp.) 100-150 Amperes.

STARTER MOTOR BRUSHES

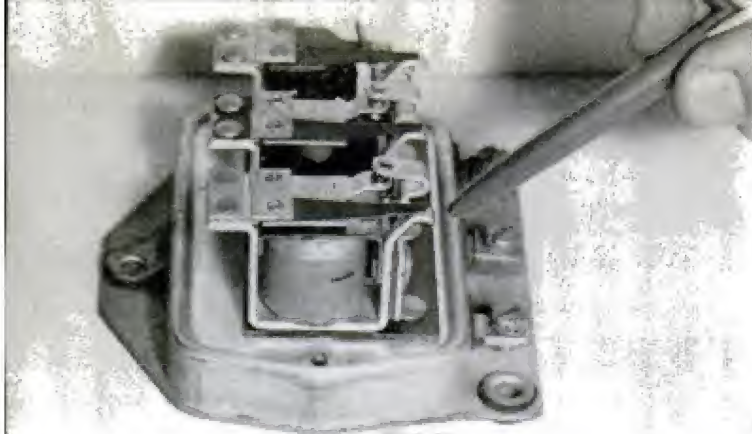
Mfg. Length (Min.) (Inches)	Wear Limit (Inches)	Brush Spring Tension (Ounces)	No. Used
0.43-0.46	3/16	48-56	4

5. THERMOMETER covering engine temperature range will do in a pinch. An insulated mount is necessary

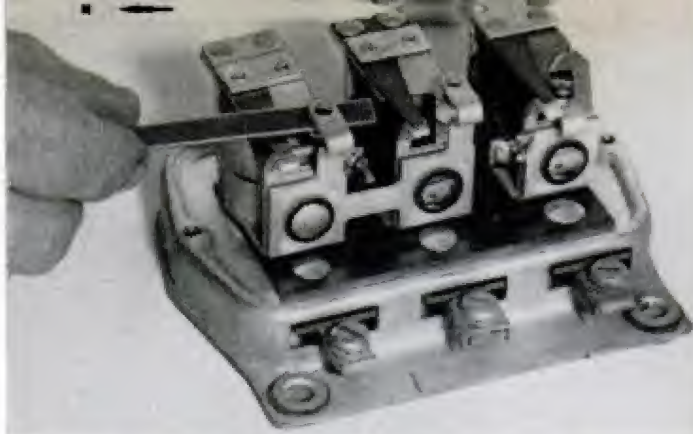


6. RESISTOR of 1/4-ohm capacity assures correct regulator adjustment when used with test equipment

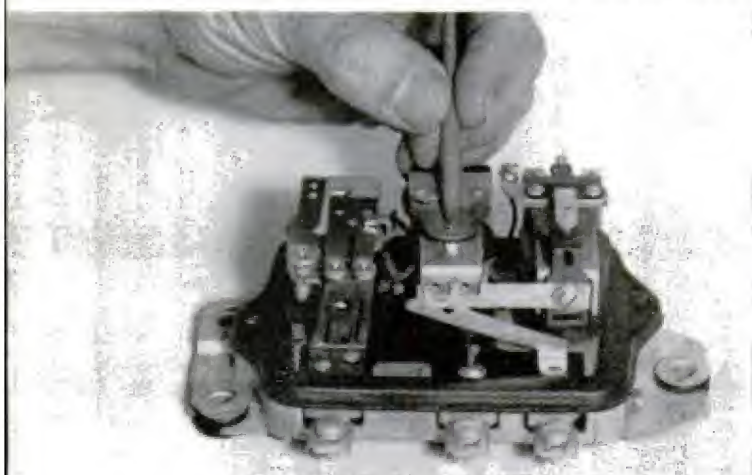




7. REGULATOR of riveted construction is adjusted by bending brackets (pointer). There are no screws



8. THIS METHOD of filing points on riveted regulators is permissible but is not generally approved



9. CORRECT METHOD of filing points on most regulators. Special file forms required concave surface



10. CLEAN ELECTRICAL CONNECTIONS are critical in wiring. Take time to do a thorough job of cleaning

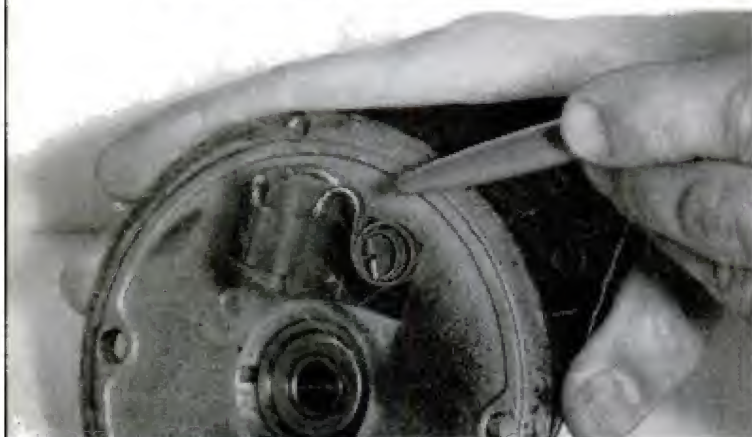


11. COMPARE OLD and new generator brushes, above. Below, be sure brushes are correctly seated

leaks that reduce electrical efficiency. First disconnect the battery cable and then use a small wire brush (a suede shoe brush is just the thing) to get rid of dirt accumulations. To do a good job you likely will have to disconnect each terminal in the generator-regulator system to get at the dirt. Before disconnecting, at any time, identify each wire or cable as in Fig. 3, with a mark or tag.

Assuming that you've checked out the battery as has been previously described, polarize the generator, Fig. 2. This should be done each time before starting a test. Then start the engine and allow it to warm

12. A COMMUTATOR in good condition can be cleaned with a soft cloth. Very fine sandpaper also is used

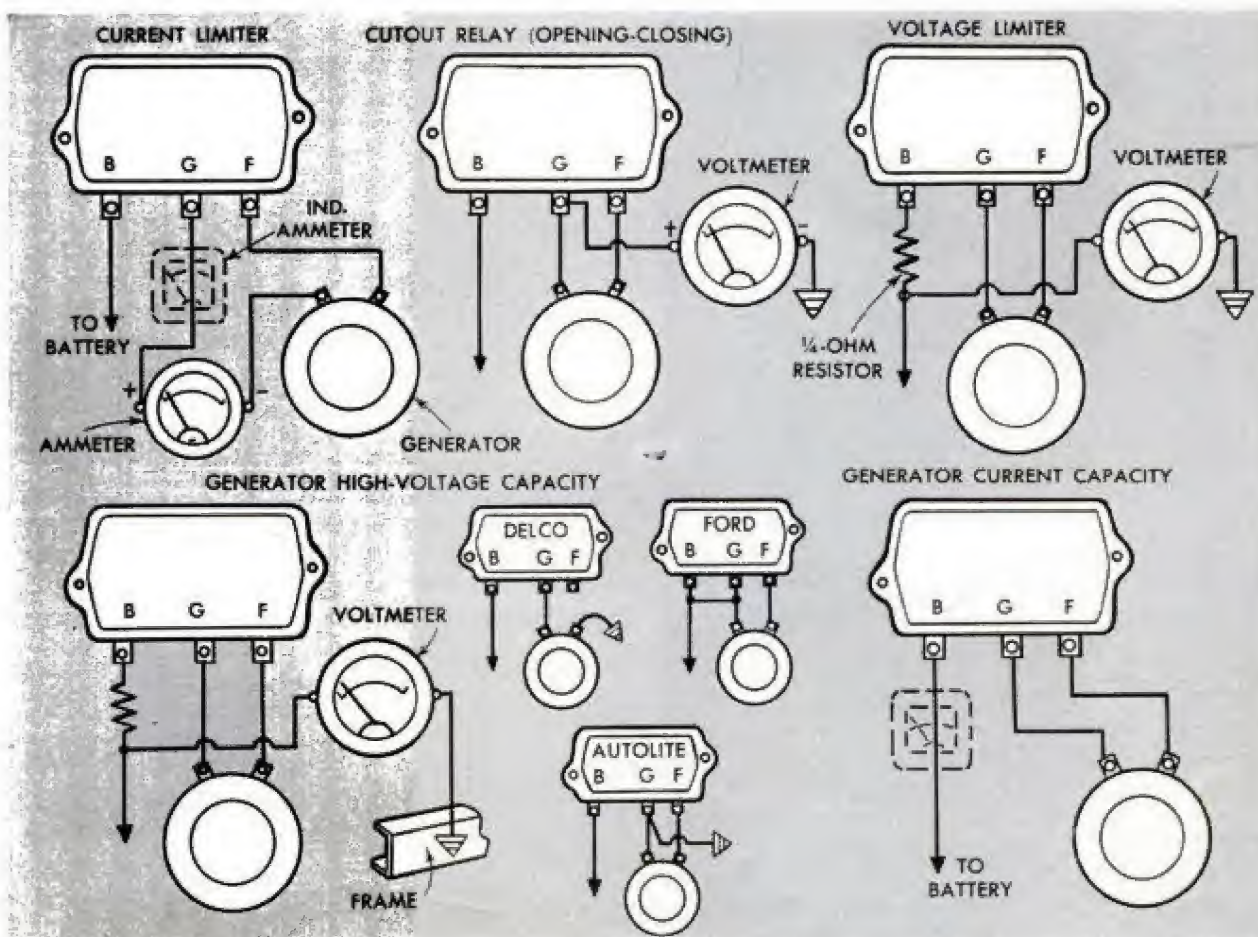
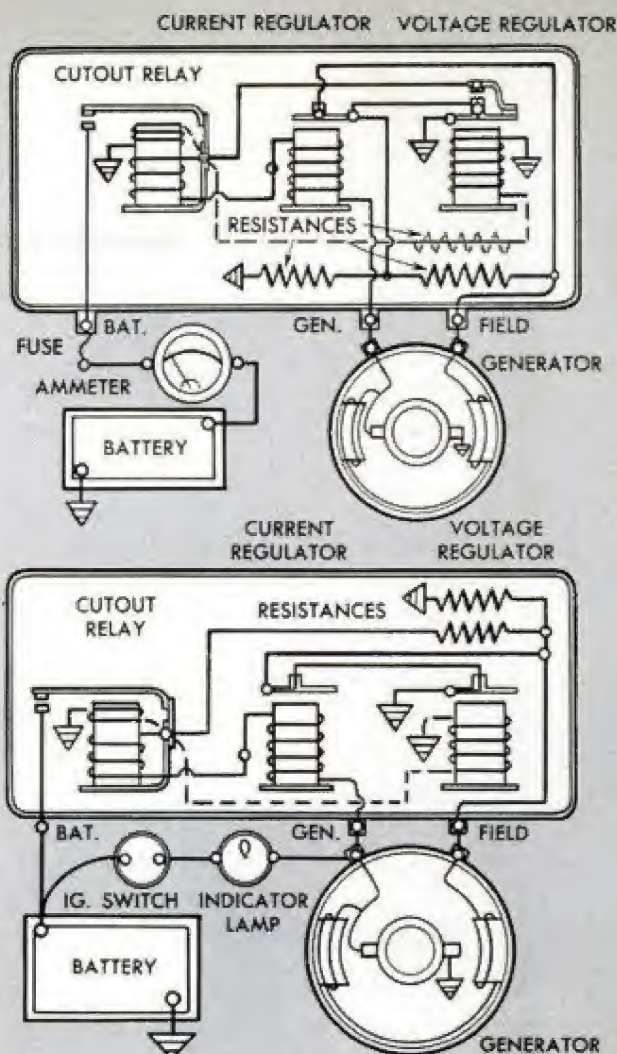




13. WHEN TIGHTENING fan belt you may need a pry bar to hold generator while you tighten the bolt

to operating temperature. Rev it up to fast idle, about 1500 r.p.m. Connect a wire from a clean ground to a cleaned spot on the regulator base. If the charge indicator light goes out, or if the indicator rises, a poor ground exists. With the engine still at 1500 r.p.m. connect a wire from the battery terminal (usually it's marked "BAT.") on the regulator to the armature or generator terminal (ARM. or GEN. markings). If this corrects the trouble, the regulator should be replaced. Or, with the engine still at about 1500 r.p.m., disconnect the F, or FLD. (field) terminal of the regulator and touch it to the generator or armature (GEN. or ARM.) terminal. If this corrects the trouble, replace the regulator.

(Continued to page 208)



By Arthur Mikesell

Conclusion

THE CONTROL STAND, Fig 21, may be mounted either port or starboard, depending on your preference. First, cut the $\frac{3}{4}$ -in.-plywood mounting panel for the steering blocks and secure this to the inside of the side planking in the proper position. If you plan to use a throttle lever rather than the aircraft-type throttle (which is mounted on the dash), cut and mount a block for this in the position indicated in Fig. 9, Part I.

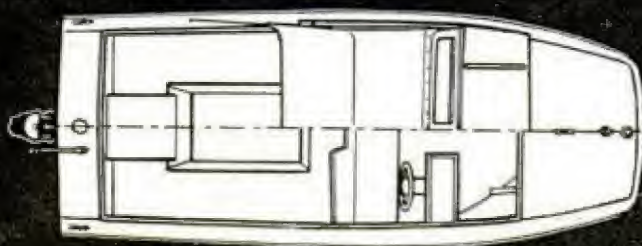
Secure the $\frac{1}{2}$ -in.-plywood leg to the inboard stringer and attach the dash panel to this leg, the underside of the sheer shelf and the steering-block mount. After installing the forward panel to give the stand rigidity, use a hole saw or saber saw to cut holes in the dash for the wheel, steering cables, instruments and controls. Later, after the coaming has been installed, deck the stand with $\frac{3}{8}$ -in. plywood and add a narrow rim of quarter round or scrap square stock to hold cigarettes, sunglasses, etc., on the stand. Since the top of the stand will be varnished to match the coaming, countersink all fastenings and plug the holes with wood putty.

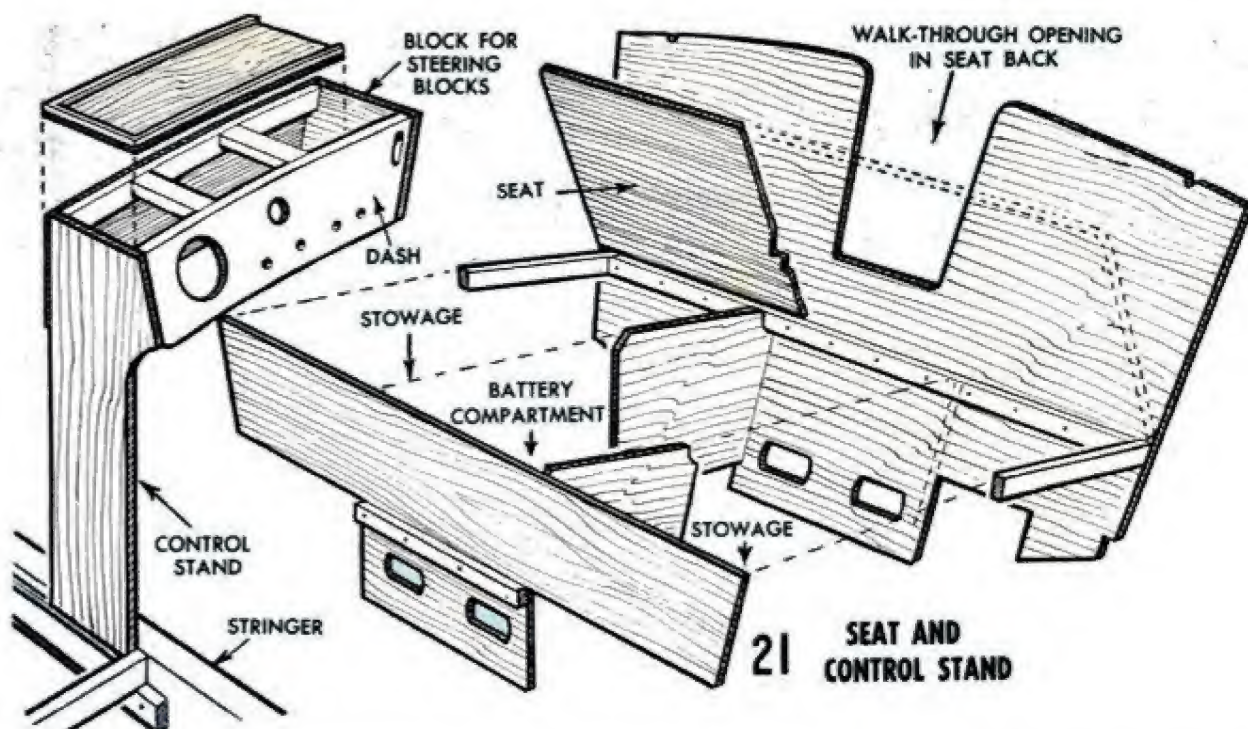
The seat bottom and forward seat bulkhead, Fig. 21, are cut from $\frac{1}{2}$ -in. plywood. The underseat dividers, which also serve as seat supports, should be $\frac{3}{4}$ -in. plywood notched for the cleats mounted on the seat back and forward seat bulkhead. The ends of the seat are supported by cleats attached to the side planking. Before securing the forward seat bulkhead, treat all underseat surfaces with a good wood preservative (Penta or similiar) and floor the outer storage compartments with $\frac{1}{4}$ -in. plywood. The center compartment, which will hold the battery box, is not floored. After securing the cleats, dividers and forward bulkhead, install the seat bottom using a length of piano hinge.

Since the floorboards will receive extra-hard wear, they are cut from $\frac{1}{2}$ -in. plywood surfaced with a resin-impregnated fiber permanently fused to the wood (Harborite, Duraply or similar). You will have to take the floorboards up later, so use flatheaded screws to install them. Outer floorboard panels will reach from the chine to the center of the inboard stringer, center panels cover the space between the inboard stringers just aft and forward of the seat. The outer forward panels, Fig. 22, must be cut to fit the curve of the hull, but shouldn't come in contact with the bottom planking. The panel under the control stand must be notched in order to fit around the leg, and

BUILDING THE PM

JET





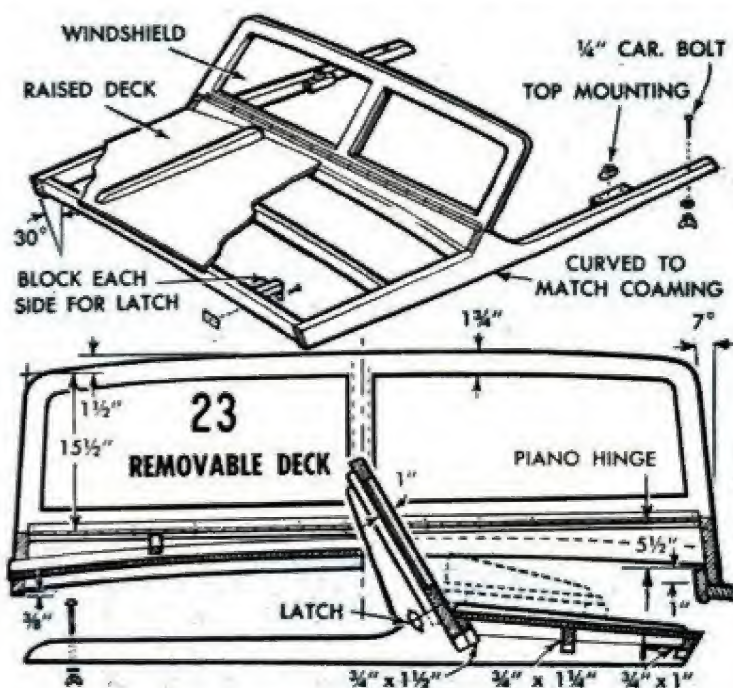
a cutout added to this notch to allow clearance for the power cable which runs down the inside of the leg. Use two short panels to floor the center section ahead of the seat so that the shift lever, Fig. 26, can be mounted on a small, well-braced panel for extra rigidity.

You are now ready to make the transom cutout for the jet unit. As mentioned last month in Part I, the unit used in the *PM Jet* is a two-stage model manufactured by Buehler Turbocraft, of Indianapolis, Ind. Since jet units are not standardized, all details in this article pertaining to the jet installation apply to *this unit only*. If you are considering another unit, consult the manufacturer before you start to build the *PM Jet* so that the necessary modifications can be made.

Measuring up the centerline on the outer surface of the transom, locate a point $6\frac{1}{2}$ in. from the outside of the bottom planking and bore a 2-in. hole. Now set the jet unit on the intake block so that it is hard against the transom with the drive shaft at the aft end protruding through the hole. Place the point of a compass on the center of the drive shaft and scribe a circle for the jet exhaust to the dimensions given by the manufacturer. Remove the jet unit and cut out this circle with a saber saw, then replace the unit and mark centers of the mounting-base holes



FORWARD FLOORBOARD panels must be cut to follow the curve of the hull but shouldn't come in contact with the planking





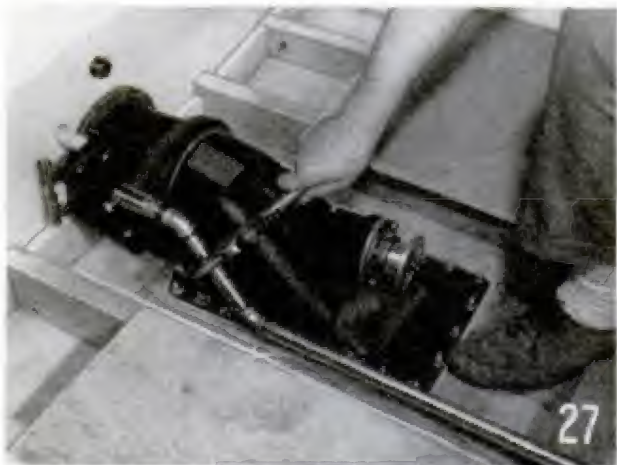
TRANSOM CUTOUT for the jet exhaust should be cut and tested for fit before installing the gas tank

for drilling. After locating and drilling these holes, Fig. 24, put the jet unit aside and complete the transom.

If you plan to purchase a gas tank rather than build the tank detailed in Part I, Fig. 2, make sure that it will fit inside the transom or you will have to extend the transom to cover the tank. Before installing the tank, brace the transom with 1 x 3 stiffeners cut to fit snugly between the longitudinal frame members. The long upper stiffener must be cut to match the curve of the transom top. The gas tank is held in place with metal straps and sits on two legs which are mounted to the outer sides of the inboard stringers. Two short 1 x 3 deck beams help to brace it laterally.

After installing the gas tank, measure 11½ in. forward from the inner face of the plywood transom and construct a frame for the false transom. The two lower members of this frame sit on top of the stringers. The upper member is notched for the sheer shelves and curved to follow the rear deck crown. If you wish to use the two side compartments for storage, seal them off from the jet-unit tunnel, floor them and cut

SMALL-DIAMETER PIPE running just inside the inboard stringer connects the shift lever to the jet unit



BEDDING COMPOUND must be used when installing the jet unit and at all other through-hull fastenings

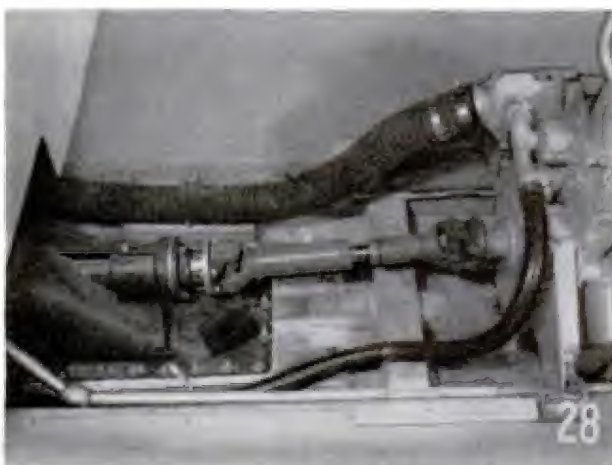
access holes in the perforated-hardboard transom cover. The transom decking shouldn't be installed until you have completed the next step, fiberglassing the sheer shelf.

Bring the edge of the cloth about ¾ in. down the side of the sheer mold and just over the inside edge of the sheer shelf. The outer edge of the cloth will be covered by aluminum "J" mold, and the inner edge will be masked by the coaming. Once you have completed the fiberglassing, the fore deck and transom deck may be installed.

Shape the coamings as shown in Fig. 5, Part I, and use countersunk screws to fasten them in place. End coamings should be sawed to match the crown of the deck as this curve is a bit difficult to achieve by bending. Since the coamings are to be varnished, plug the screw holes with wooden plugs.

Before installing the engine, jet unit and controls, Figs. 24-28, remove the floorboards and treat all surfaces below the floorboard line with wood preservative (Penta or similar). Follow the manufacturers' installation instructions for each unit, making

DRIVE SHAFT, motor exhaust tubing, water hose and jet unit all fit under the low-profile walkover cover





SHIFT LEVER mounts on a small, rigid floorboard panel outside and slightly aft of the control stand

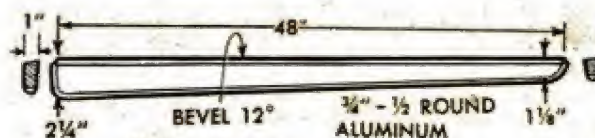
cutouts as necessary in bulkheads and transom. Be sure to use bedding compound on all through-hull fittings, Fig. 25, (i.e., jet intake, motor exhaust, jet exhaust, etc.). Mount steering blocks to lead the cable from the quadrant across the inside surface of the transom to the corner and under the sheer shelf to the control stand. Once the position of the control cables has been established, the knees can be installed. Make a cutout in one knee for the control cables, then secure both by nailing through the side planking and toenailing into the bottom of the sheer shelf.

The quarter fenders, Fig. 29, can now be shaped and mounted. Use plenty of bedding compound at these through-hull fastenings since the quarter fenders are mounted close to the water line. Don't install the half-round aluminum molding on the fenders until the boat has been painted.

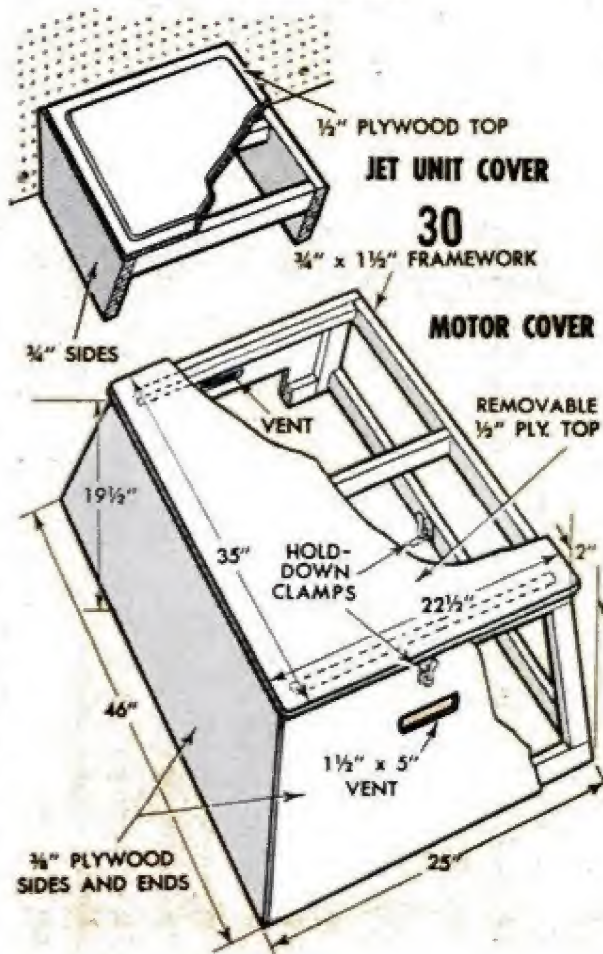
The motor cover, Fig. 30, is simply a vented box with slanted ends and a removable top. After constructing the frame and attaching the $\frac{3}{8}$ -in. plywood sides and ends, cut cleats to fit snugly between the side members of the upper frame. Bevel one of these cleats to match the angle of the rear of the box and mount it on the underside of the top so that the beveled side fits flat against the rear frame member when the top is centered. Attach the other cleat toward the front of the top and add a hold-down clamp to the front of the box to lock the top in position. Two other clamps mounted on the inside of the bottom frame members will hold the cover to the inboard stringers. This engine cover is designed for use with an Interceptor 100 marine inboard. If you plan to use any other engine, check the dimensions before you make the cover so that it can be enlarged if necessary.

The walkover cover for the jet unit, Fig. 30, sits on the inboard stringers between the edges of the floorboards. Make sure

(Continued to page 202)



29 QUARTER FENDER

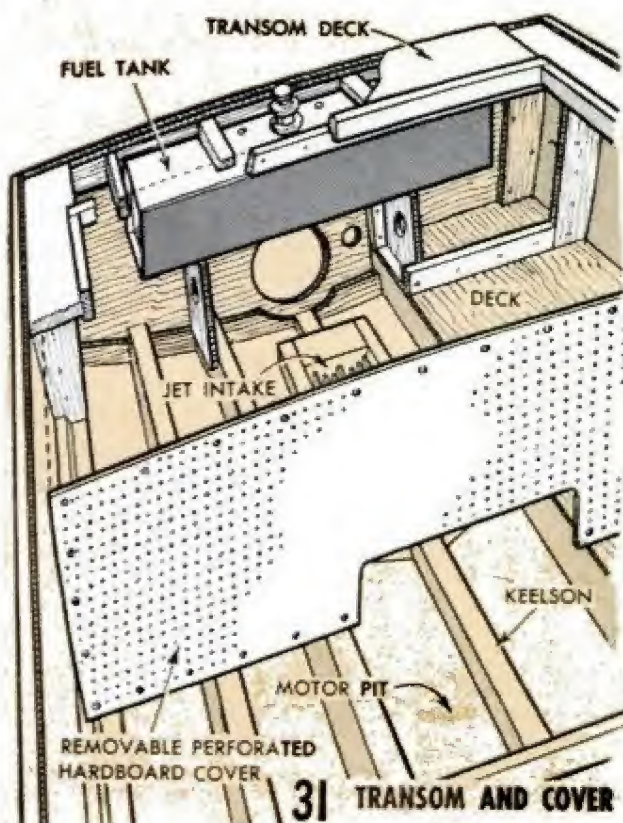


MOTOR COVER

JET UNIT COVER

30

FRAMEWORK



31 TRANSOM AND COVER



Coming Up Next...

TERMITES! You can have termites working in your home for years and never know it. No, the walls are not likely to collapse or the foundation cave in, but the structure may be extensively damaged before you discover the pests—unless you read the article in May PM telling what signs to look for, where and when. Termites are quite easy to locate, and eradicate, if you know how to go about it.

WHEN PAINT PEELS. You put paint on the outside walls of your home and it peels off, leaving unsightly patches of bare wood. Why? There are several reasons and in next month's PM we're going into the whys—not only why paint blisters, peels and alligators, but how to repair the damage and prevent it from recurring. That's a large order, you may say, but wait until you read the article.

TRAVELER'S ELECTRONIC ENLARGER. Sound like something different from the mine run of photo-studio equipment? It is different—packs into a carrying case only $3 \times 7\frac{1}{2} \times 8\frac{1}{2}$ in., has a built-in electronic timer and electronic exposure meter. Practically automates the process of making blow-ups from 35-mm. film. The parts you buy to build it cost about \$30.00. Coming in PM's May issue.

DECORATIVE DADO CUTS. Ordinarily you use a dado head for cutting grooves in cabinet joinery, but try setting it up to cut a groove diagonally across one face of a panel and slightly more than half way through the thickness. Turn the panel over, cut another groove on the opposite diagonal and then look at what you have. Get the idea? Decorative dadoing is PM's shop feature for May.



Easter Tree

Why not a tree for Easter? To make one utilize an existing shrub, indoors or out. Punch holes in both ends of eggs and blow the contents into a pan. Then place the shells in egg dyes. When dry, place the shells on the twigs of the shrub as pictured.

—John Krill

Plant Cap

If an unexpected spring frost warning catches you with prized transplants in the open row, protect them with paper bags or cartons anchored with "sticks" made from coat hangers. One coat hanger makes two anchors, each having a hook which is inserted in a hole in the bag.

—Earl C. Hillhouse



KEEP THESE IN MIND

Reseating Old-Type Faucet

In many older-type bathtub faucets the seats are difficult to reach with a standard reseater, especially those having integral, or nonremovable, seats. One plumber improvises the reseater detailed and powers it with his small portable drill. It renews the seats in a jiffy.—*Robert L. Sargisson*

You don't need a special centering punch to center screw holes accurately when fitting hinges or other hardware having countersunk holes. The shank ends of most twist drills are beveled to a point, making them self-centering. Therefore, choose a drill having the same diameter as the holes, apply the shank end of the drill to each hole and tap the cutting end with a mallet or block of soft wood.—*Ken Murray*

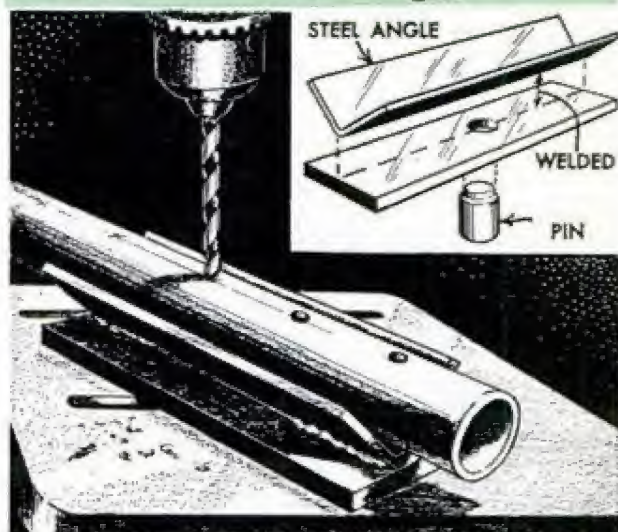
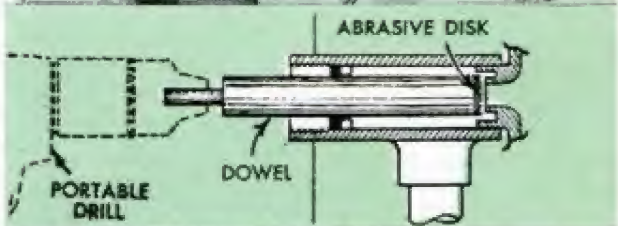
V-Block That Stays Put

If you have been wanting to make a V-block for your drill press, here's one designed so it won't slide off the table. An anchoring pin protruding from the underside fits the hole in the center of the table to hold it in place. To make this V-block you'll need a piece of flat steel and a piece of steel angle about 8 in. long. Before welding both together, a hole is drilled and reamed in the center of the flat-steel part for a shouldered pin turned from drill rod. The pin is made to fit the table hole with slight clearance and shouldered for a distance of $\frac{1}{2}$ in. so the V-block can be shifted slightly in all directions for precise alignment of the work with the drill bit.—*H. J. Gerber*

Mailing Tube Assures Even Legs

When shortening or evening up chair or table legs, you'll find that a slotted mailing tube will prevent you from winding up with a footstool. Measure the distance from the lower end of any leg to the first cross member rung and subtract the amount you wish to cut off. Transfer this measurement to the mailing tube and cut a slot in the wall of the tube. Then slip the tube over each leg in turn, place the saw in the slot and make a few strokes to mark the correct length. When evening up legs, find the shortest leg and use the distance between the end of this leg and the cross member to locate the slot in the tube.—*Bil Toman*

Frequent retempering of mortar to keep it moist will not be necessary if the mortar board is painted. The painted surface will keep the wood from absorbing the water from the mortar.



VACUUM CLEANER

Household



MOST FAMILIES have had a vacuum cleaner in the house as long as the older members can remember. About all that's ever been done to it in the way of servicing has been to change the dust bag when it gets full of dirt. A cleaner averages once-or-twice-a-week use, it gets knocked about, the cord and hose may have been stepped on and it may even have tumbled downstairs once or twice. But when you plug in the cord, or what's left of it, and kick the switch you expect it to run. And usually it does.

As a rule the hose goes first—gets to looking something like the one in Fig. 2. Nothing to do but replace it. A hose that leaks is practically useless.

Tank-type cleaners like the one pictured, also those tank cleaners, sometimes called canister cleaners, that operate standing upright, are fitted with a screen, or filter, between the dust bag and the motor, Fig. 1. This should be cleaned occasionally and each time it is removed for cleaning, it should be examined closely for tiny breaks. If any holes show up, replace the filter. Purpose of this filter is to catch and retain dust that may escape the regular dust bag and prevent it from getting into the motor.

The next step in general servicing is to remove the end cap, Fig. 4, or whatever is necessary to permit the motor to be removed from the unit. Check the switch, visible in Fig. 3, for looseness. Tighten if necessary, or, if it seems at all unreliable, replace. Retape the connections. The motor

Appliance Fix-It File

pictured in Figs. 3, 5 and 6 is typical, although all vacuum-cleaner motors are not of the same size and appearance. Nearly all are of the universal a.c./d.c. (series) type, having carbon brushes which wear down in time to the point where they no longer make full contact with the commutator. Remove the brushes by unscrewing the retaining caps, Fig. 5, making sure that you keep them in order so that they can be returned to the holders in the same position as they were originally. If the brushes are worn badly (as a rule $\frac{3}{8}$ in. is too short) and especially if they are chipped at the edges of the concavity which contacts the commutator, they should be replaced.

The commutator brush track should be examined closely. If it is smooth and shows no wear groove where the brushes ride, wipe it with a dry cloth and let it go at that. If it is slightly rough to the touch, it is permissible to smooth it lightly with very fine sandpaper. Don't use emery cloth or any kind of solvent. If on the other hand, the commutator is grooved, remove, take it to your electric shop and have it turned down and the mica separators undercut. Brush dust from the armature and coils before re-assembling the motor. When you reassemble the cleaner, Fig. 4, be sure that parts are returned to their respective positions and that all screws and bolts are tightened to a uniform tension. If the power cord shows breaks at points where it flexes when in use, it should be replaced.

—John Pennington

P.O. Box 475

Pueblo, Colorado



WORKING WITH SHEET METAL

By C. W. Woodson



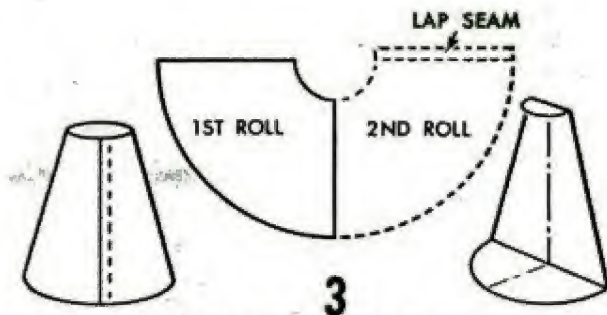
1. CUTTING SHEET METALS can be done with a portable jigsaw with metal-cutting blade as pictured above, with a squaring shear as in Fig. 2, or with various types of tin snips, several of which are shown in Fig. 25. Sheet metals of 22 gauge or thinner are easily cut with tin snips. For accurate work in cutting to pattern, lines should be scored on surface of metal so that they are easily visible and readily followed with snips. For smooth work cutting edges of snips should be very sharp

Here's the how of working sheet metal from the simplest operation to the broader field of development and forming with machines

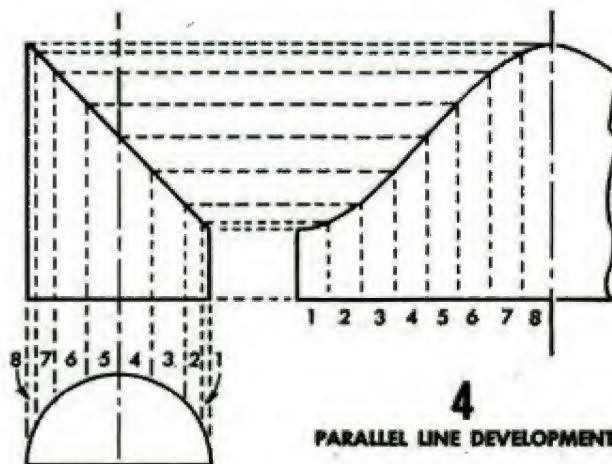
WITH SUITABLE metal shears, or snips, to cut the material to size, a hammer and a squared hardwood block or two over which to make angle bends, you can do basic sheet-metal work. Go beyond simple projects and you'll need more tools, more shaping devices, also anvils and bench stakes on which to make seams and radius bends. Beyond this point one enters the field of professional work involving the use of hand and power-operated machines and advanced methods used in the development of sheet-metal shapes.

Three basic methods of developing a given shape are shown in representative form in Figs. 3 through 6. These by no means cover the field of development, but do indicate methods of procedure. The shortcut, rollation method originated by R. W. Poe, Canton, Ill., is quite widely used in the development of the more simple forms. Figs. 12 and 14 through 16 show how the method, Fig. 3, is carried out when making the top of a funnel or similar bell shape. The joint in the funnel top, or bell, can be seamed as in detail A, Fig. 11, and hammered flat as in Fig. 12, or can be sweat-soldered before soldering on the neck, Fig. 11, B. For procedure in laying down a conical shape (or what is to become a conical shape) note the right-hand detail in Fig. 3 and compare with Fig. 14. The cutout in Fig. 14 is then bent as in Fig. 15 and the edges chalked. The final step in the rollation method is pictured in Fig. 16. The other development methods such as parallel-line development, Fig. 4, radial-line development, Fig. 5 and development by

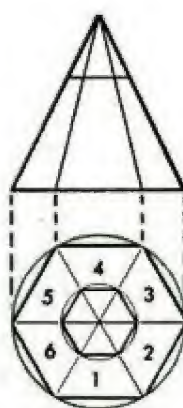
FOOT-OPERATED SQUARING SHEARS are regular equipment in sheet-metal shops, in large school shops



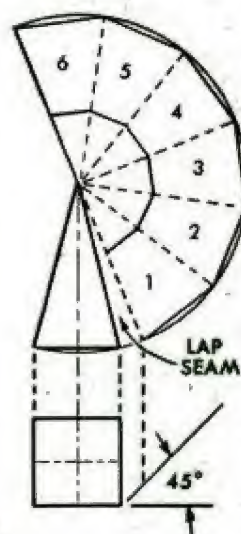
3
"ROLLATION" METHOD OF DEVELOPMENT



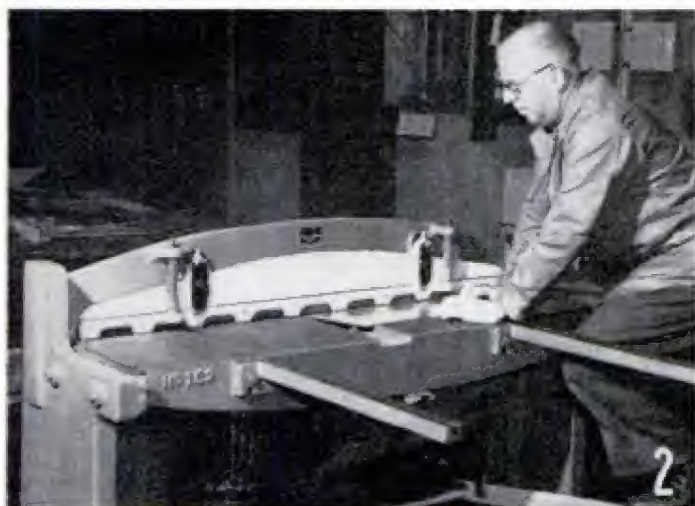
4
PARALLEL LINE DEVELOPMENT

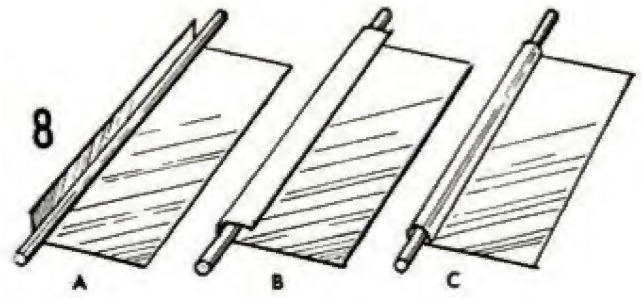


5
RADIAL LINE DEVELOPMENT

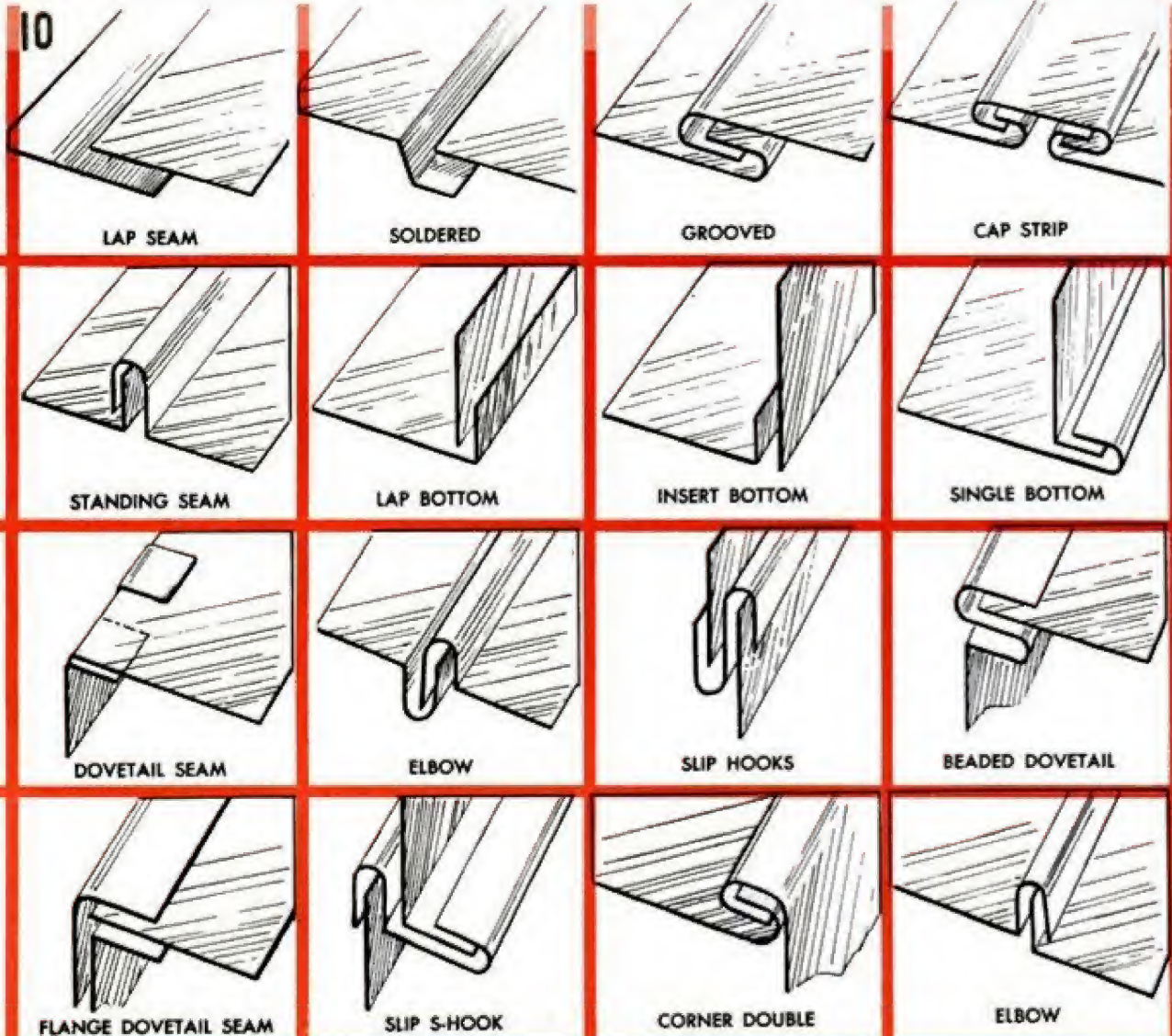
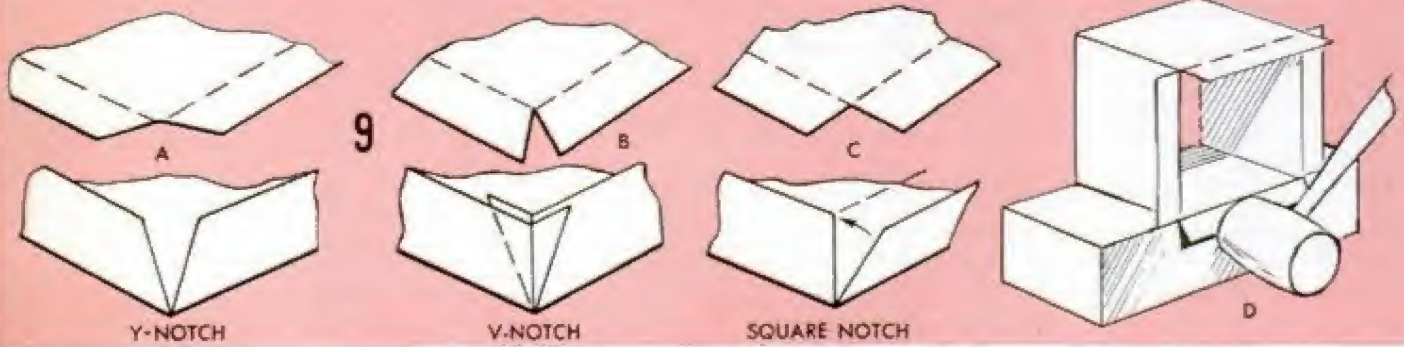


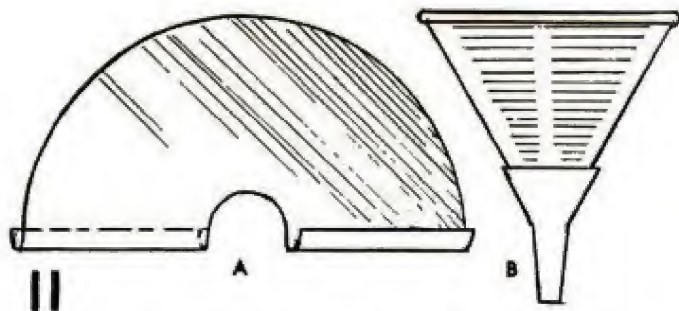
6
DEVELOPMENT BY TRIANGULATION





WIRING AN EDGE by hand methods is a good test of skill. Details above show the three basic steps and photo at the left shows how mallet and pliers are used to bend edge. Or, use a seaming tool, Fig. 25





FUNNEL TOP, or bell, is laid out by the rollation method, Figs. 3 and 14 through 16. Note that in detail A the locks are formed for the joining seam which is being hammered down on a stake as in Fig. 12

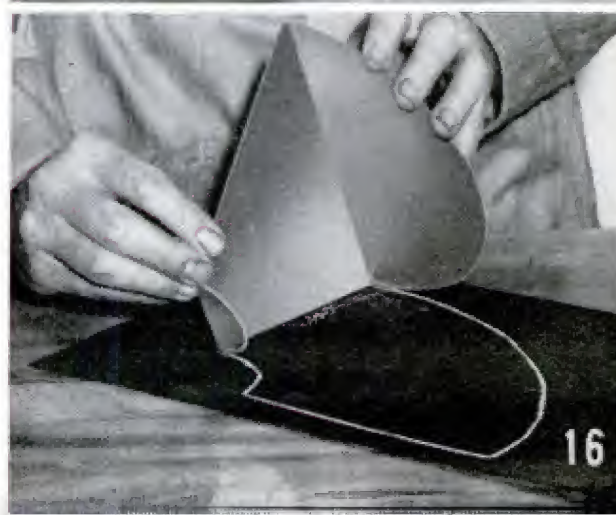
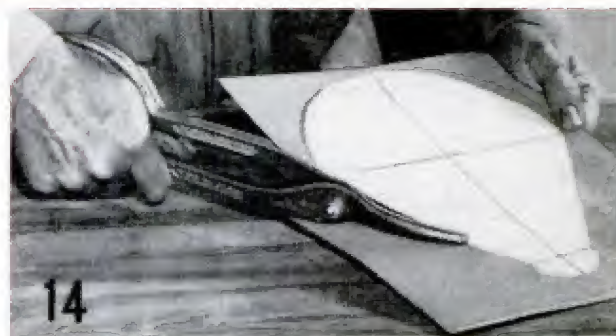


DOVETAIL SEAM FOR ATTACHING FLANGE

triangulation, Fig. 6, are methods used in advanced work in the laying down of large and involved shapes.

Nearly all sheet metals, both ferrous and nonferrous, of 22-gauge or thinner can be cut easily with ordinary tinner's snips, Figs. 14 and 25. Heavier gauges are best cut with compound-lever shears, or with a hacksaw with a blade having not less than 24 teeth per inch. You also can use a portable jigsaw, Fig. 1, fitted with a metal-cutting blade. Many sheet-metal shops and some school shops are equipped with a squaring shear, Fig. 2. Foot-operated units of this latter type usually have a capacity in mild steel of 16 gauge and a nominal cutting width of 30 in. or more.

Hand-wiring an edge, Fig. 8, is a good test of one's skill as a tinsmith. Of course, in shops this job usually is done on a machine, Fig. 17, but you can do a creditable job by hand as in details A, B and C in Fig. 8, using a wood mallet and a pair of pliers, as in the accompanying photo, Fig. 7. Start with a right-angle bend in the sheet as in detail A. Turn it back on itself with the wire inside as in detail B, using the mallet and the pliers in conjunction to make a smooth bend. Wiring usually is done before the part is formed. You'll find wired edges on such commonplace items as pails, pans, funnels, garden carts—almost any open-top container made from sheet metal. The wired edge adds greatly to the strength and durability of any sheet-metal container and improves appearance.





STANDARD ROTARY MACHINE is regular equipment in most sheet-metal shops. Here an edge is wired



ROTARY MACHINE with deep throat. See also Fig. 20. Here a bead is being rolled on a smoke-pipe elbow

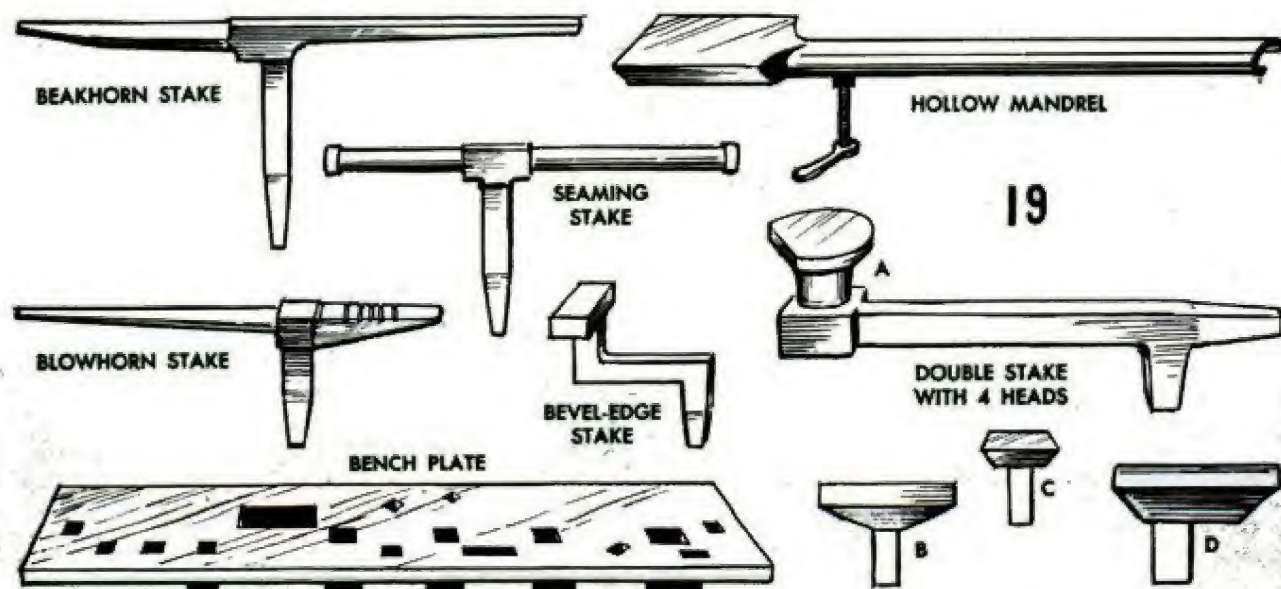
Another step in simple forming which one should be familiar with before tackling any type of corner joining is the method of notching and clipping at corners to produce neat, attractive work. The square notch, used on simple boxlike forms, permits corners to be fitted tightly, details C and D, Fig. 9. The V-notch can be cut as in detail B, producing an overlap for riveting or soldering, or can be cut as in detail A to form a neat corner without an overlap. It also is used for double seaming on work having inside flanges. Bend the flanges against a solid hardwood block as in detail E, using a wood mallet or a soft hammer to prevent denting or scoring the metal.

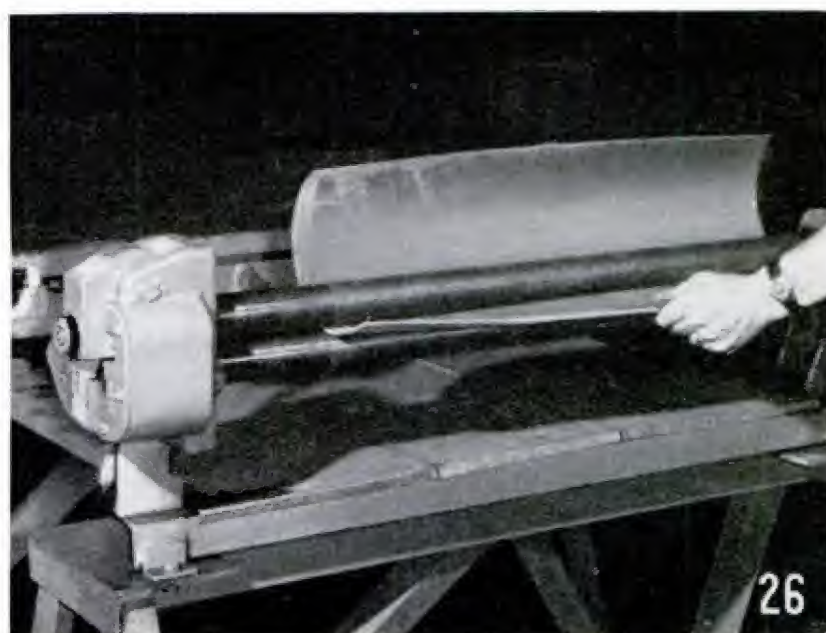
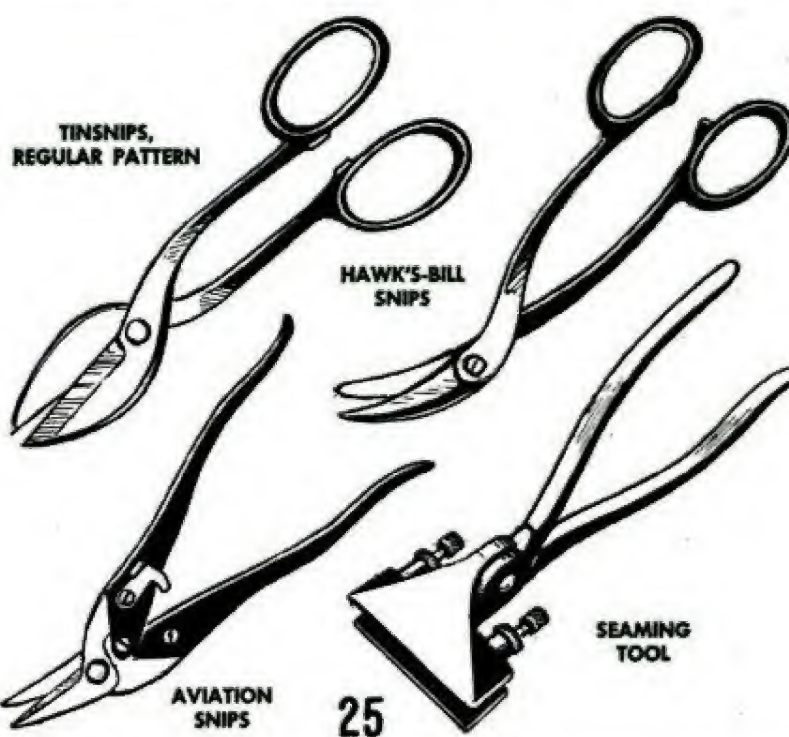
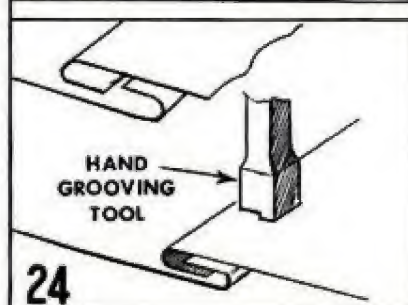
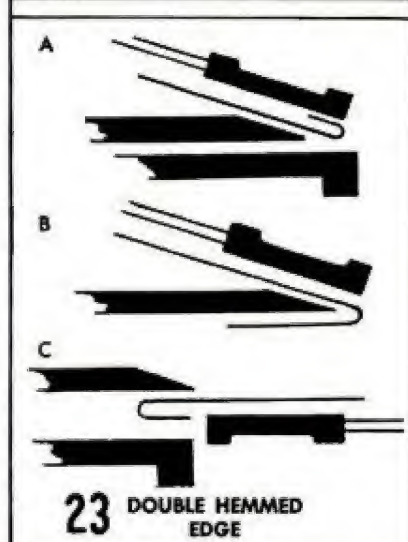
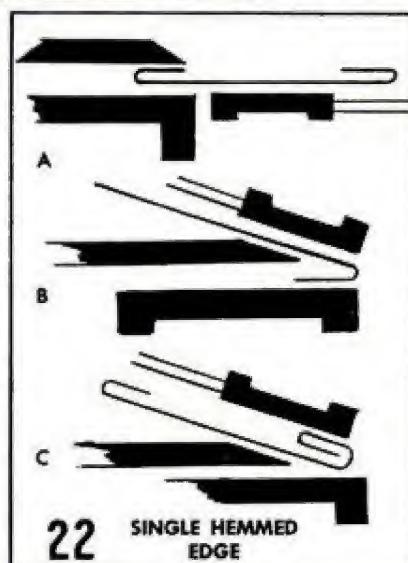
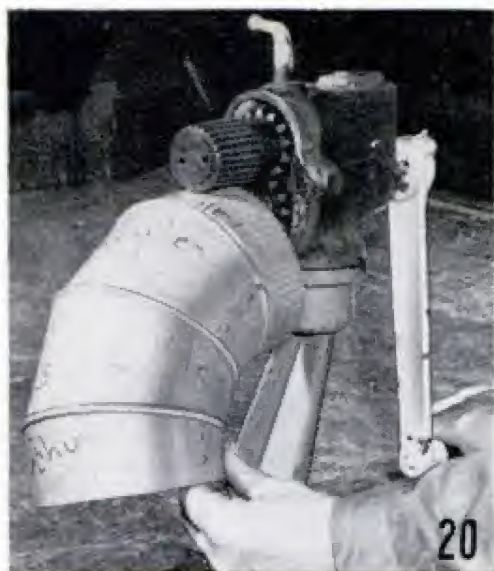
Progressive steps in making a dovetail seam of one type are shown in Fig. 13. This method is often used when joining a flange to a cylindrical shape. The latter is scribed near the end with a visible line and is then clipped at spaced intervals as in detail A,

the cuts stopping at the scribed line. Next the alternate tabs are bent out and at right-angles as in detail B. Now the flange is cut and slipped over the remaining vertical tabs, which are finally bent outward over the flange as in detail C. The finished job is shown in detail D. For added strength the tabs may be sweat-soldered.

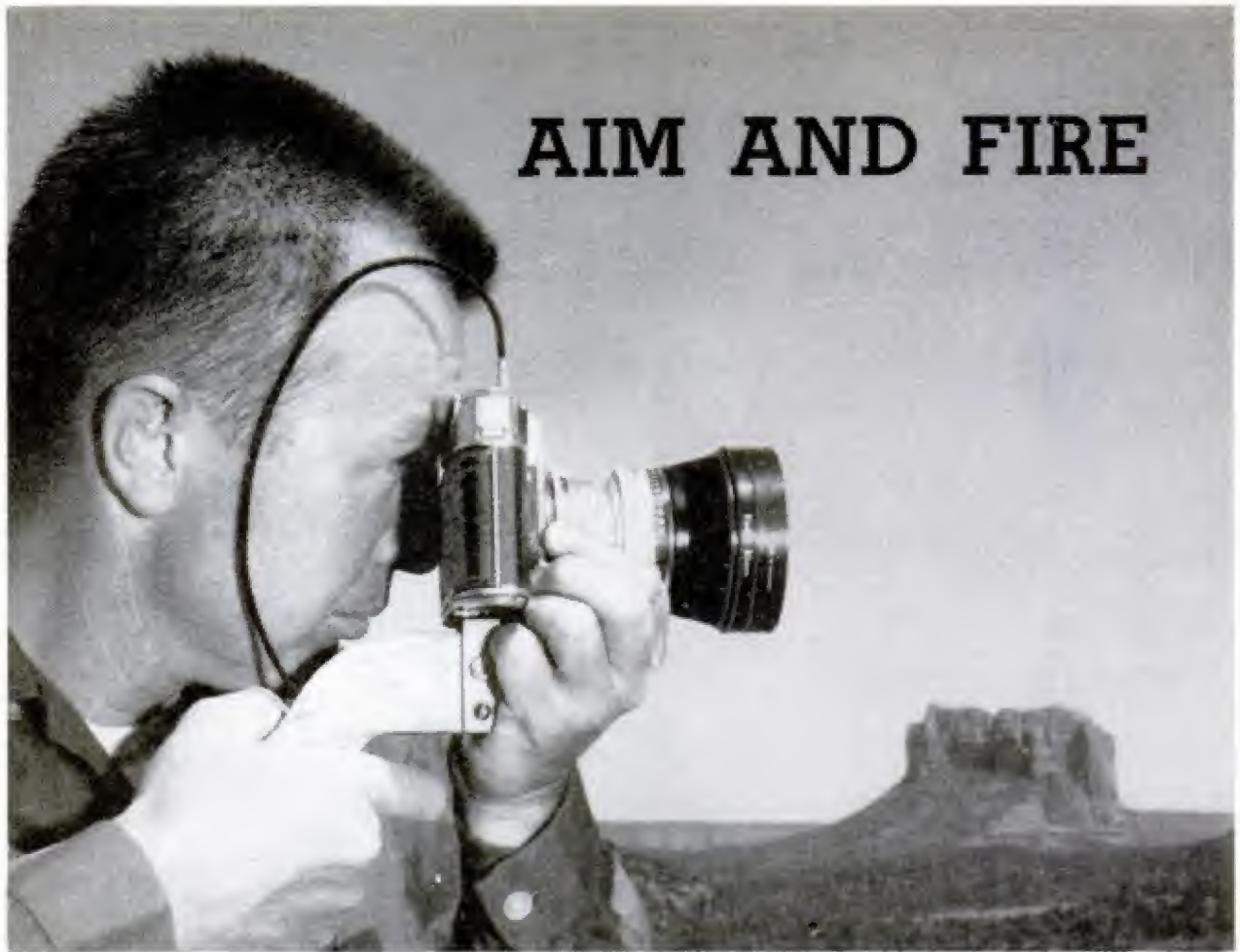
Fig. 10 details various types of locking seams and typical soldered seams that are commonly used in joining sheet metals. Most of these can be formed on a bar folder, Fig. 21. Of course, the seams are not shown as they will appear when completed, as they are shown open, or unlocked, to indicate the relationship of the folded edges. Some of the seams must be sweat-soldered, of course. While most of these bends are made by machine, some can be made easily by hand with the simplest tools. You will find these seams on various

(Continued to page 216)





AIM AND FIRE



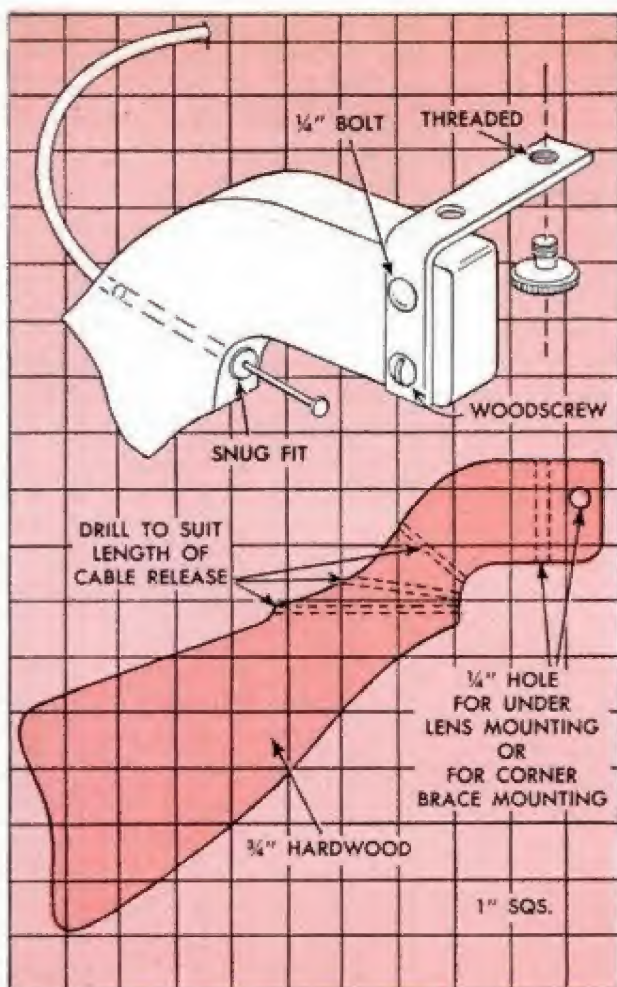
ALTERNATE MOUNTING shows how a bolt inserted through hole in top of the gunstock is used to attach 400-mm. camera

ANGLE BRACKET on the side of the gunstock provides universal mounting for nearly all 35-mm. cameras. Note cable release



MOUNTED on a gunstock and triggered by a built-in cable release your camera is aimed and fired like a gun. You're ready for instant action and the gunstock provides the steady tripod support needed for those long-range telephoto shots and fast-action pictures. The photo at the top of the page shows how the left hand in focusing the the camera also helps to steady the gunstock, assuring those sharp trigger-action shots every time.

Since arm reach will vary with the individual, the gunstock should be custom fitted. Here it might be wise to cut a stock from cardboard first and try it for size. It may be that you will have to increase the size of the squares when enlarging the magazine pattern or simply increase the length an inch or so. The pattern given will suit an average-size person. Select a choice piece of cabinet wood, such as walnut or mahogany, so it can be finished nicely like a gunstock and look like a part of your camera equipment. Tape your final paper pattern onto the wood and saw



along the outlines with a jigsaw or band-saw. Then sand and round the edges.

Since most 35-mm. cameras have an off-center tripod mounting socket, a metal bracket is used to attach and center the camera on the stock. A regular 2½-in. corner bracket is perfect for this, one leg being shortened and a new hole drilled. The detail shows how the bracket is held to the gunstock with a bolt and wood screw and how it is tapped at the outboard end for a knurled camera-mounting screw.

Just where you drill the stock for the cable release is determined by where it connects to the camera. Some cameras will require a longer release than others. The right length will require a "trial" fit at the store. Select one long enough to avoid kinking. The hole for the release should be just large enough to pass the threaded end. A cable with a swivel end makes it easier to connect to the camera rather than one which has a fixed tip. In actual use, the stock is rested against the upper part of the chest (not against the shoulder as in holding a rifle) due to the fact that sighting must be done with the eye level even with the view finder at the top of the camera. Learning how to hold the camera for a quick shot will require a bit of practice.

—Thomas C. Thomas

FOR CAMERA BUGS

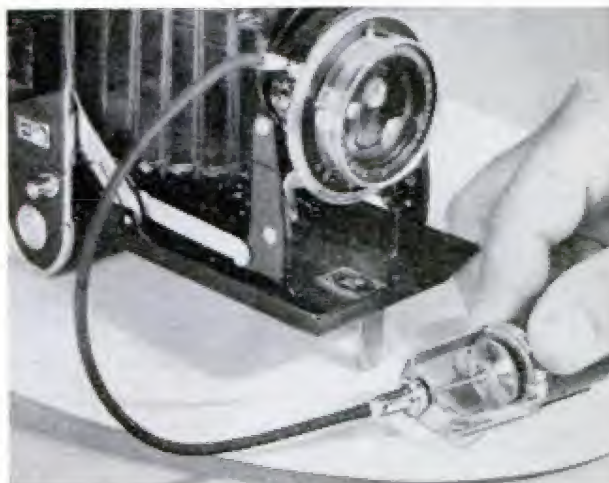


Easy Print Spotting

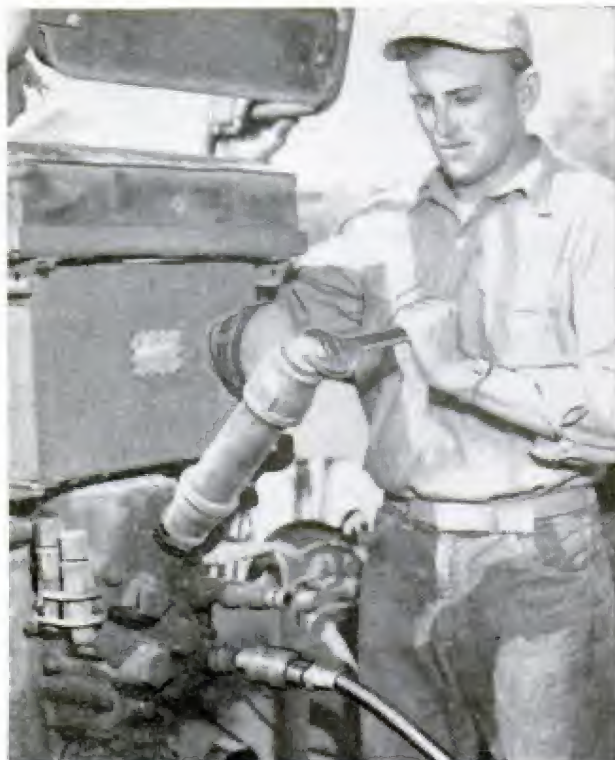
Spotting prints is much easier and they are not as likely to pick up annoying glare if they are held at an angle rather than on a flat surface. Lay them on a slightly larger piece of corrugated cardboard and use two rubber bands to hold them flat. The cardboard is light and easy to handle and making it larger than the print will give you an edge by which you can handle it without touching the work. This will also give you an area to remove excess toner from the brush.—Wayne Floyd

Double Time

After you have the gang in the view finder you release the self-timer and dash to get in the picture yourself, sometimes with amusing results. You'll have plenty of time to include yourself and pose if you use an auxiliary timer attached to the cable release. Cock both timers and when you're ready, release only the auxiliary timer. The built-in timer will not begin to function until after the first completes its cycle, which gives you that much more time to get yourself set in the picture.



FARM TIMESAVERS

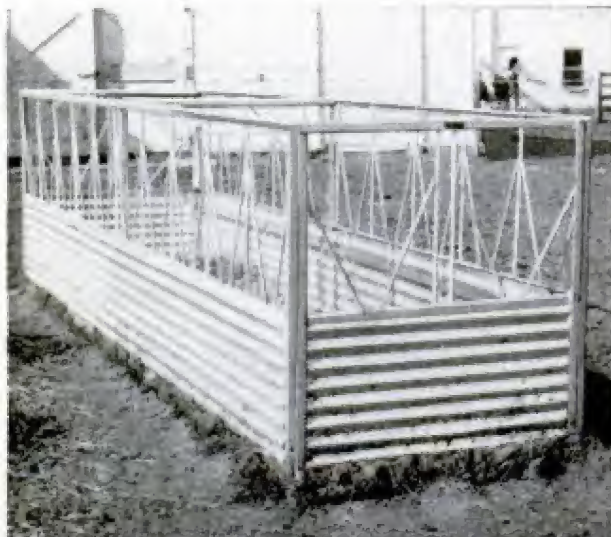


High Lift

By adding a 12-in. nipple of 2-in. pipe, fitted with reducers and a plug, to the hydraulic tractor unit, a trailer bed can be boosted 1½ ft. higher for faster unloading of small grain and ear corn. The pipe adds about 3½ quarts to the normal capacity of the hydraulic unit.—A. M. Wettach

All-Welded Feeder

Available commercially, this all-steel roughage rack can save its cost in a feeding season by greatly lessening feedlot losses of such roughages as hay and the various fodders which are a part of the daily ration of livestock on feed.



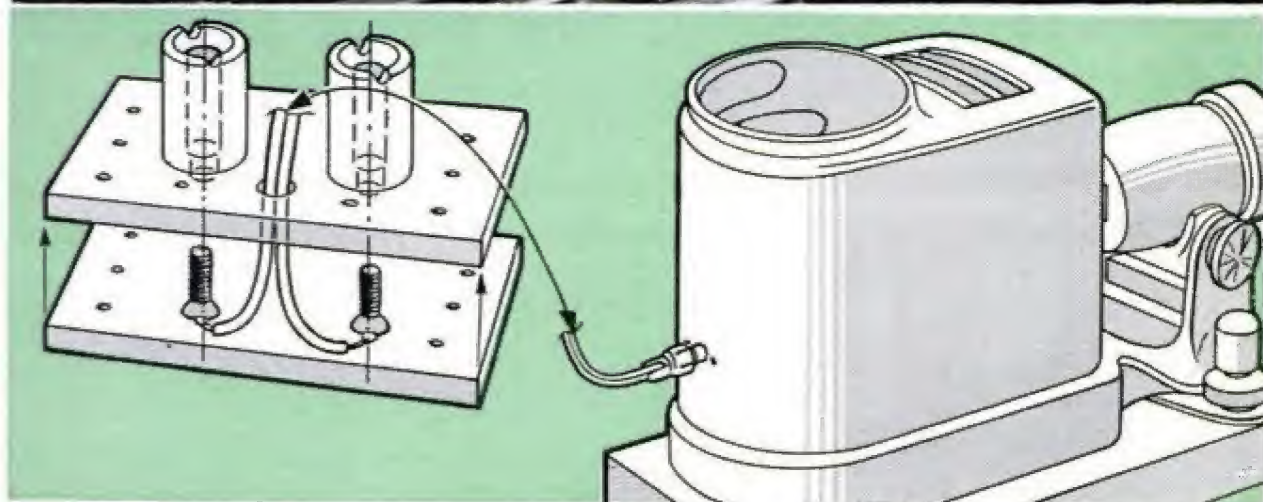
Automatic Snuffer

Designed and built by the Department of Agricultural Engineering, Iowa State University, this gas-welding cart has a wind-shield for outdoor use, hose bins, tank racks, pilot light and automatic snuffer which controls the hose-line valves. Torch goes out when placed on a control cradle.

Extra Gas

A tank holding 50 gallons of extra tractor fuel mounted on the field nurse truck can save an hour or more of time on a big farm when a tractor runs out of gas. Tank should be mounted high enough to transfer fuel by gravity alone.





Tape Sync for Slide Projector

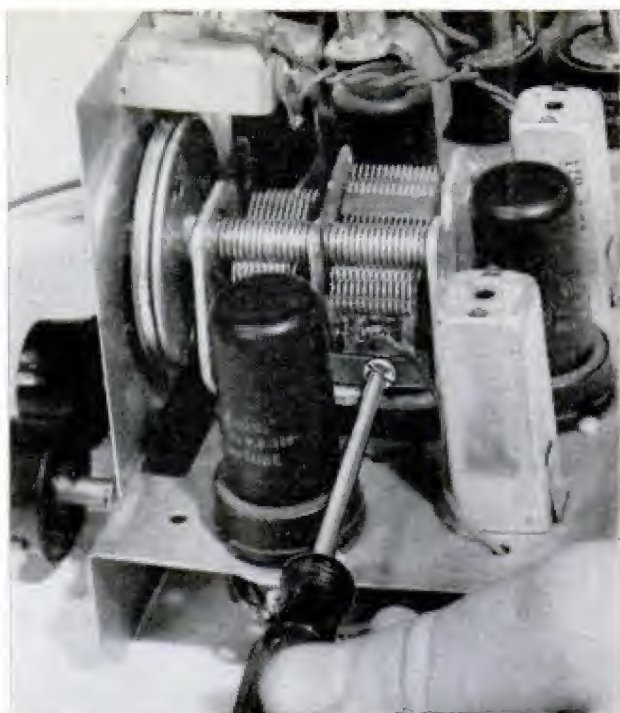
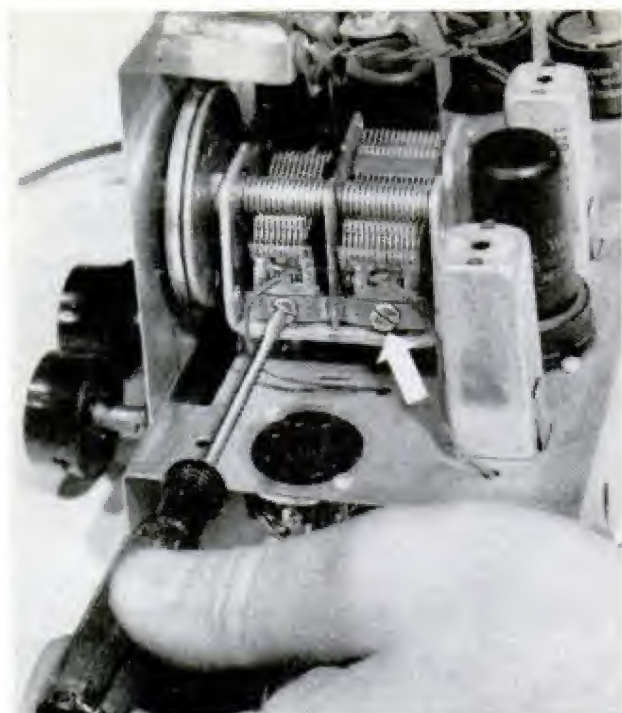
TURN THE LIGHTS DOWN, turn on the tape recorder, and your first slide is projected on the screen. From there on, you sit back and enjoy the show with your guests. Slides change automatically, timed with a prerecorded tape narration and background music.

The key to such a system is a small plastic "sandwich" on which two brass spacers, $\frac{1}{4}$ inch by $\frac{3}{8}$ inch long, are mounted as shown above. Connect these spacers to the switch circuit of an automatic slide projector as in the drawing.

With your slides in proper sequence for projecting, add the narration and music to

a tape recording. Whenever you want to change a slide, apply a strip of aluminum foil tape (arrow in photo) to the *shiny* uncoated side of your recorded tape. Then, with the switch mechanism connected to the slide projector, when you play the tape the aluminum "cue" strips close the circuit and change the slide.

The brass spacers and the 2 x 3-inch perforated phenolic sheet from which you cut the base pieces are available from Lafayette Radio, New York; the miniature zip cord from Saxton Products Co., New York; and the aluminum foil tape from local stores or Minnesota Mining.—Byron G. Wels



LOCATE TRIMMERS on sides of capacitors. Set dial at station whose kilocycle frequency is known (check newspaper listings). Then adjust front trimmer (left above) until station is strongest at correct dial setting. (Tube was removed here for photo purposes only). Repeat for several stations for best compromise. Repeat with rear trimmer (right above) adjusting for best volume, checking a few stations

10 Ways to Improve AM Radio Reception

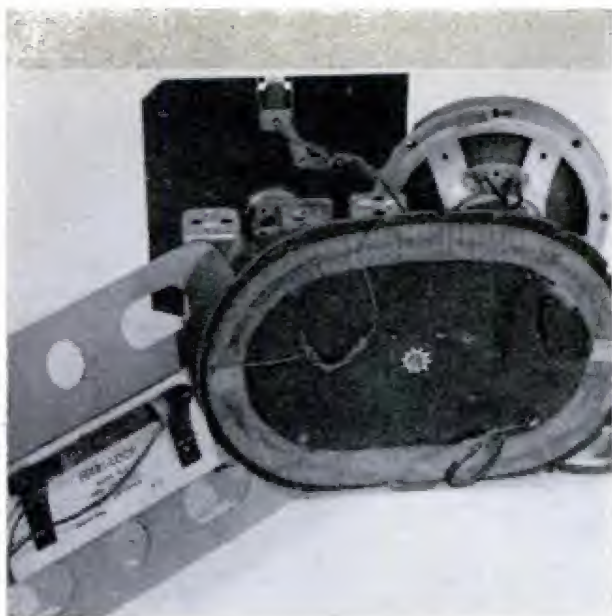
COMES A TIME when your a.c.-d.c. table radio may not sound as perky as it used to. The reception may be too weak and the static too strong. Buzzes, rattles or hisses may emanate from the speaker. Just turning the volume control may create scratchy sounds and the dial may seem casual about pinpointing the station you want. When this day comes, your set is obviously overdue for a "tuneup."

Remove the radio from its cabinet and

replace the knobs on their proper shafts. It's wise to eliminate any question of weak or dead tubes by pulling all and testing them at the local radio shop or drug store. With sound tubes, you are ready for the ten-step tuneup that will restore the set to almost new performance. Whenever you test with power on, use an insulated screwdriver. Oldtimers may have their arms calibrated in volts, but play it safe by keeping one hand in your pocket!

TUNING SLUGS are at top and bottom (under chassis) of two IF transformers. Turn carefully one at a time listening for maximum volume. Turn lightly; forcing will hurt transformer. Right, if pilot lamp doesn't work, rectifier tube will burn out faster. Lamp holder snaps out with slight squeezing of fingers

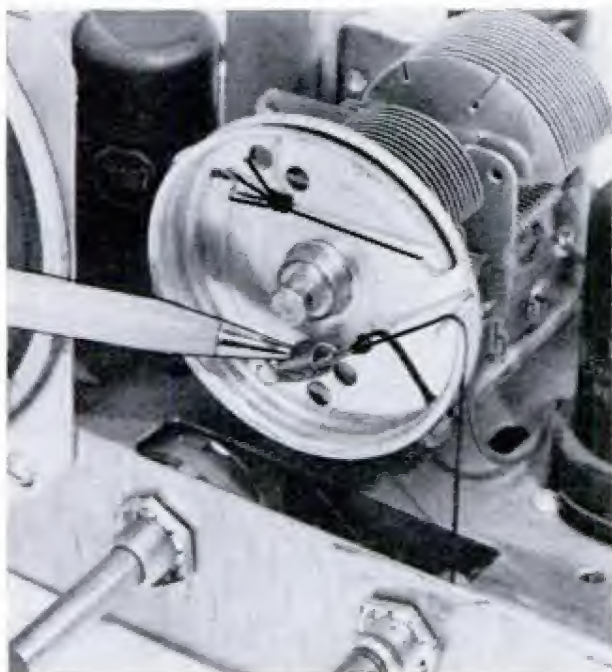




IF SET USES wire loop antenna (above right), substitute ferrite antenna (left) to improve reception. Longer ferrite rods provide the best performance

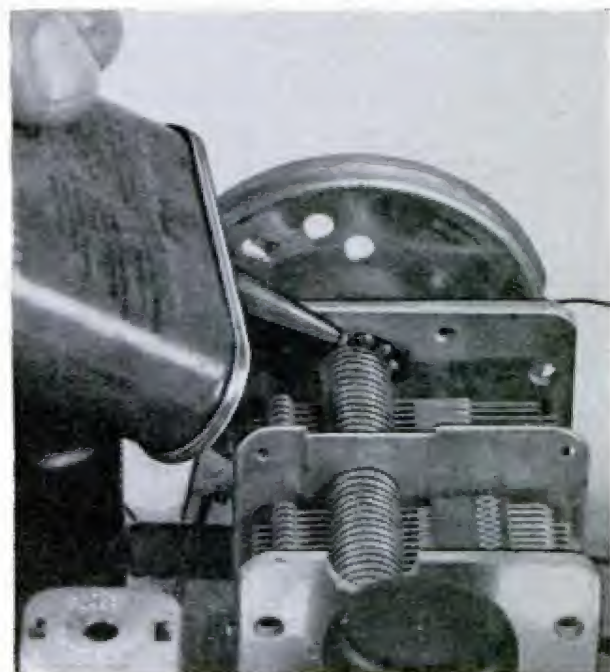


MINOR TEARS produce scratchy sound in loudspeaker. Patch cracks with several layers of tissue paper using household cement or loudspeaker cone cement



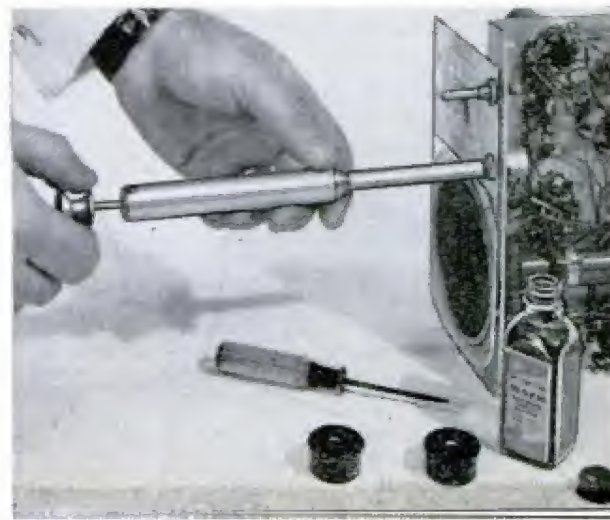
FOR ACCURATE TUNING, dial-cord tension should extend spring slightly. Loose cord causes pointer jumping. Cord slippage is corrected with dial-cord dressing

USE PIPE CLEANER and spray-can contact cleaner to remove resistance-causing dust particles. Unmesh capacitor plates for more room. Don't deform plates



TO LUBRICATE capacitor for smoother tuning, use a light machine oil on bearings front and rear and all moving control shafts. Don't get oil on wires

IF SPECIAL INJECTOR is available, use liquid contact cleaner to provide smoother noise-free action on controls. Some solutions have eyedropper syringe





WIRING a twist-lock plug on a soldering iron and a mating receptacle on the end of a retractile reel gives you a handy retractible soldering iron. For portable use away from the workbench, make up one cheater cord with a female socket and an a.c. plug



YOU CAN SIMPLIFY removal of tape boxes from storage files by using index tabs such as are used for office filing systems. These not only make convenient handles, but you can mark the contents of the box on the exposed portion of the plastic index tab



Electronic Tips

PLASTIC CABLE TIES serve a double purpose. In addition to keeping wire cables neatly in place, each is provided with a convenient screw lug which mounts the tie and the cable to the chassis. Tie is wrapped around cable, pulled through slot, and excess cut

HOT RECORDS make racks. To make a unique record rack, run the center of a record through a candle flame a few times. When you feel the disc start to "give," bend it over a sharp table edge. When it cools, you have a novel rack for record, book storage





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mowing gets
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CLINIC FOR HOMEMAKERS



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Restoring Appliance Finishes

Q—The white finish on our refrigerator is chipped in a few places. Is there any way I can patch up these spots without having them show and without refinishing the entire appliance?

A—If you're willing to spend a little extra time doing a careful job, you can refinish damaged spots so they won't show, except under close inspection. First, clean up areas with fine sandpaper, removing all rust and wax; then, wash with soap and water.

After removing the rust and wax, work all around the damaged areas with 220-grit silicon carbide paper, feathering the edges so finish slopes towards the middle of damaged areas. To the bare metal, a coat of metal primer is applied. Once this finish is dry, smooth it lightly and rough edges of the old finish to bond subsequent coats.

A finishing coat of lacquer or enamel is sprayed or brushed on. If enamel is used, allow at least 48 hours drying time before proceeding. A 400-grit silicon carbide paper is used to sand areas until edges are practically invisible. During the final operation, the sandpaper should be dipped frequently in soapy water, which acts as a sanding lubricant.



Termite Damage

Q—We've found a small mound of insect wings near the foundation of our house. A neighbor says they are termite wings. Now we're afraid termites may be in the house. How can we tell?

A—It's often difficult, since subterranean termites stay hidden except during the spring mating season and again in the fall. Then you may see flying insects which look something like flying ants. If you see these, you can be sure termites are at least in the neighborhood, and you will want to check for possible damage.

Clear indications of their presence are crooked tubes of mud extending up masonry walls in a basement or up concrete piers under a basementless house. These shelters reach to the wooden sections of a building, where worker termites go for their food. Once the workers establish a path to the



wooden structure of a house, they will eat their way along the grain of the lumber, never once exposing themselves. At worst, the first signs may be sagging floors and settling walls. Wood attacked by termites reveals a honeycombed structure. If severe damage has occurred, a professional exterminator should be called in immediately.

Termite damage can easily be controlled today by using proper construction methods and chemically treating the earth around a house. Topping foundations with rust-proof metal shields and treating understructures with pentachlorophenol will keep termites from entering by these paths.

Using a chlordane insecticide (mixed according to instructions), solution is poured or brushed into foundation cracks. Afterwards, seal these openings with a concrete mix. For soil treatment, a trench is dug two feet deep around the foundation and half the insecticide poured into it. The rest is poured over the soil as it is replaced.

★ ★ ★

GET READY FOR ALL THE SUMMER'S JOBS

Set up a Weldwood
Wood Finishes shelf
in your workshop



Prime outdoor furniture with Weldwood Firzite.® Seals, prevents wild grain. Reduces checking. Makes paint go farther, flow evenly. Also excellent base for stains when tinted with colors-in-oil.



Repair wooden screens with Weldwood Waterproof Resorcinol Glue. Forms permanent bond that withstands weather, fungus, rot, heat and cold. Ideal for outdoor furniture, boats, sporting goods, toys.



Stain wooden fences with a Weldwood Exterior Stain: Redwood, Driftwood, Sierra Brown, or Cascade Green. Deep-penetrating, hard-drying oils that resist weather, wear, and sunlight. Easy to use.

How handy to have supplies at your fingertips when you need them! It's easy. Keep these Weldwood® adhesives and finishes on your workshop shelf, and you're set for practically every job, indoors or out: Firzite, Exterior Stain, Spar Varnish, Resorcinol Glue, Wood Preservative. Total cost: only a few dollars. And you save yourself time and trouble! Shop your lumber yard or paint and hardware stores this week.



Products of United States Plywood

I Fished the Finest Spot

(Continued from page 122)

The lakers broke a long-standing tradition of the Canadian north country that week by a lack of enthusiasm for metal spoons, their usual staple. On the second day I switched to my ace-in-the-tackle-box, an import from the Puget Sound salmon country called a Lucky Louie. The big plug, one of the greatest lures for big salmon and trout, is almost unknown east of Idaho's Lake Pend Orielle, but those Tazin Lake trout fell all over them, and we began taking bigger fish. On the second day Chummy and I took perhaps forty trout. On the third day, though, we broke Chummy's record. We took good fish all morning, started looking for a lunch fish at eleven o'clock, and at two-thirty we had not taken a trout small enough to kill. Plenty of fish, but bread, butter, bacon and beans for lunch, and broad grins all around.

Northerns in Shallows

I asked Chummy about the northern pike, so we ran into a bay and he showed me where they lived. A government project put a dam on Tazin Lake a couple of years before, raising the water level eight feet. The shallows moved up around the feet of the pine trees along the shore line, and the pike moved along with it, holing up around the stumps and down timber. That was the toughest fishing I have ever seen, but the pike were back there, and there were a lot of big ones.

That "someday fish"—the over-40-pound laker that you know is down there somewhere—is the ruination of fishermen who go up there looking for a little of everything. You end up forgetting the other fish and going after that big fellow; I don't think anyone ever took a walleye up there intentionally, and the greyling are considered a tourist attraction. You get record fever and that's that.

In the long north-country twilight after dinner, the fishermen usually go out again for a couple of hours, often in the middle of a doughnut-shaped flooded island near camp where the pike are thick as blackflies. They call it "The Snake Pit," and happily rattle big pike and pine trees as long as daylight, line and lures hold out. But that's the day's dessert. From breakfast to dinner you fish for trout.

This wouldn't be much of a story without a big one that got away, but my big one not only got away, but was so big that I'm ashamed to talk about him in print. He hit a trolled Lucky Louie, took it to the bottom, and stayed there, making short, bullish runs occasionally. Using a tough boat-and-

MINSEY TACKLE CO.
ROUTE 1, BOX 621
PORT ANGELES, WASH.

jetty spinning rod designed to cast four-ounce lures, a big salt-water reel and twenty-pound line, I couldn't move him. I reeled the boat slowly over him. Four times he came up, once within 10 feet of the surface. Four times he went back down, into 40 feet of black water, and 20 minutes later he snagged bottom and broke off. Well, as I said, it wouldn't be much of a story without a big one that got away.

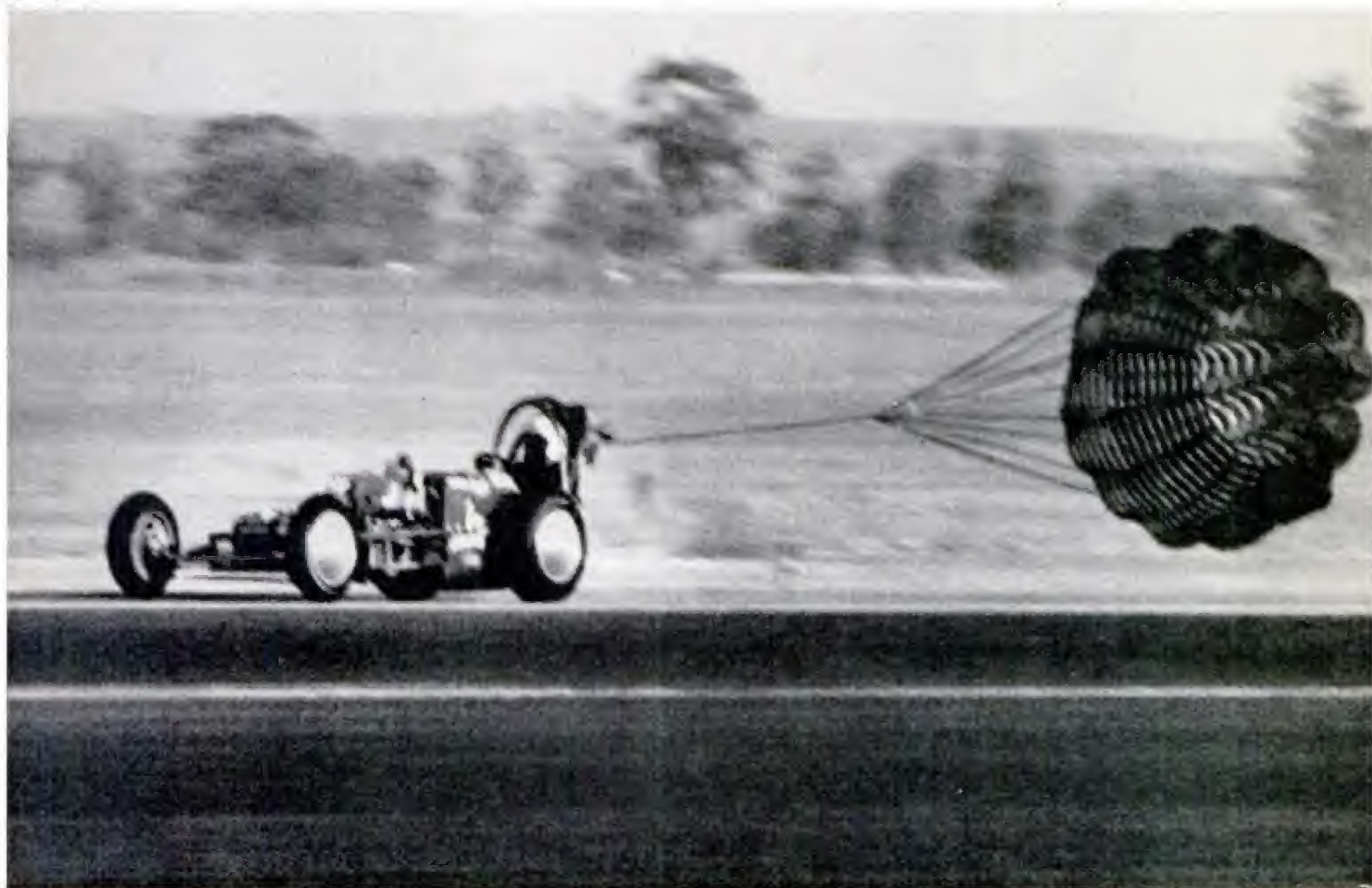
Best Lake Trout Fishing

Was it the best fishing in North America? I don't know—what's *your* definition? It is certainly the finest lake trout fishing in the business; I'll match its record of pounds-per-fisherman or big-fish-per-fisherman with any body of water. They don't keep fish under 25 pounds, and don't get excited at less than 35. That, plus the great lure of record-sized fish, is enough to get it my nomination. (The hook-and-line record laker was only three inches longer than Tazin's record, a skinny spawner far short of that weight but back in there, growing and waiting.)

What's more, it's a beautiful place. The water is so pure that you dip your drinking water over the side of the boat or off the end of the dock. You can see moose along the shoreline and eagles nest in the trees. The lake is big enough to hold big fish, and broad enough that you needn't see another fisherman all day. Yet it's also small and irregular enough that it doesn't kick up in a blow like the bigger trout lakes; there's always a lee shore to fish along.

The tab for the trip is a good big one, but not unreasonable for a once-in-a-lifetime trip; the tourist air fare from Chicago was \$260, round trip, including the charter flight in to the lodge. The rates, all-inclusive from the minute you step off the plane except for your license, smokes and refreshments, are \$275 a week per person. That's guide, boat, meals for a king or a logger—everything. The Parsons Airways seven-day trip costs \$650 a head, and gives you five days at Tazin Lake, two at Snowdrift on Great Slave Lake, and a lot less time lost around airfields. Other airlines are planning similar trip deals. The season runs from mid-June to middle or late September, with the best fishing early and late. You can bring back fillets at a special reduced rate, or you can take advantage of a trophy-handling service out of Uranium City if you get a really big one.

You can get the full story by addressing Mr. Vince Pullar, Tazin Lake Lodge, Uranium City, Saskatchewan, Canada. Tell him I sent you, and have a nice trip. *But don't catch my trout!* I'm going back after him myself. ★ ★ ★



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Building the PM Jet

(Continued from page 179)

that the three stiffeners clear the drive shaft and jet unit. When finishing the top of this cover, be sure to add nonskid compound to the epoxy paint to avoid accidents.

The removable transom cover, Fig. 31, is made of perforated hardboard and fits under the coaming. Use screws with cup washers to attach this cover to the frame of the false transom. If you have added storage compartments on either side of the jet unit tunnel, cut access holes in the cover and line these holes with half-round molding rabbeted for the hardboard.

Before painting the boat, use surfacing compound (Duratite, Lakerfill or similar) to mask all outside through-hull fastenings. Complete the varnishing first (transom deck, top of motor cover, coamings, top of control stand and fore deck), then prime all exposed wood surfaces above the floorboard line and finish the side planking and interior with at least three coats of epoxy paint. If you are using a spray gun, cover the jet unit, engine and exposed steering blocks. Epoxy paint will give a smooth glossy surface which becomes extremely slippery when wet, so if this is used on the floorboards you should add nonskid compound to the paint.

Once the finish dries, you may mount the aluminum molding on the quarter fenders and sheer. If you wish to use the boat before building the lift-off deck and windshield, the hardware, instruments, controls, seat cushions and intake screen may now be installed. In the prototype, we used two back cushions with snap fasteners located on heavy strips along the top. These snap on the male portion of the fasteners which are mounted on the back of the seat.

Intake Screen

The intake screen, Fig. 3, Part I, should be the last thing installed before putting the boat in the water. While this may be purchased as an accessory to the jet unit, you may also build it at home or have it built in a local shop. All parts are of $\frac{1}{8}$ -in. mild steel except the skeg which is made of heavier, $\frac{3}{16}$ -in. stock. After all parts are welded in place, the whole unit should be galvanized. Use bronze or galvanized flat-headed bolts to mount the screen, and remember to set them in bedding compound. Drill the keelson for the $\frac{1}{2}$ x 3" bolt which is welded near the head of the skeg, and use plenty of bedding compound here, also. Be careful not to overtighten any of these bolts.

You will note that the aft end of the skeg

(Continued to page 204)

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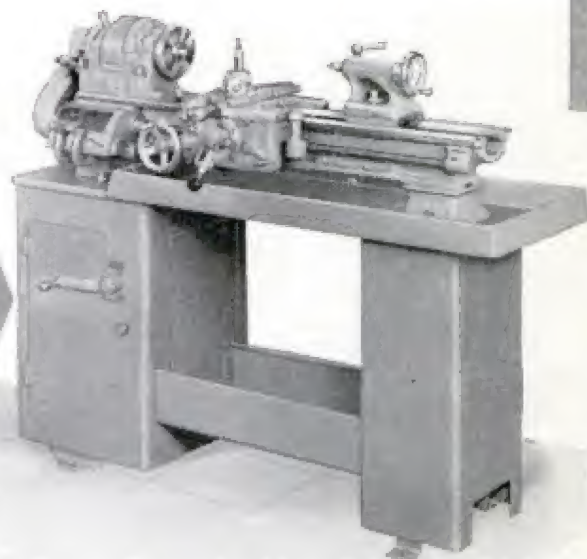
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is not welded for a distance of about 3 in. If you have made a slight error in building the boat or installing the jet unit, this section of the skeg can be used as a trim tab and bent slightly to offset any tendency of the boat to pull to one side. Most boats won't require such an adjustment, so make sure that pulling isn't due to a poorly balanced load before you bend the tab.

The lift-off deck, Fig. 23, fits over the coamings with its inside edge hard against the outside edge of the coaming. The fore edge should be raked 30 deg. and crowned to match the fore deck. Legs of the lift-off deck follow the outside of the coaming and are fairings of the windshield legs. This "outer coaming" can be cut from 1 x 2 stock and should follow the curve of the regular coaming except at the seat back. If you make the curve a bit wider here so that the legs spring in slightly, you can be sure of a snug fit to the coaming.

Mounting the Lift-Off Deck

Carriage bolts with large wing nuts are used to attach the aft ends of the legs to the sheer shelf. To hold the fore end in place, fasten blocks to the rear face of the forward crossbeam so that you can mount one half of a hold-down clamp on each block and the other half on the coaming. For a heavier fastening, drill and tap one hole in a common flat mending plate for a $\frac{3}{8}$ " x 1" thumbscrew and mount this on the inner face of the coaming. On the block, mount a corner iron with one hole drilled slightly oversize for the thumbscrew.

Since the removable deck is to be varnished, countersink all fastenings and plug the holes with wood plugs or wood putty. The windshield frame is made of $1\frac{1}{4}$ -in. mahogany and mounted with a piano hinge so that it can be folded down flat on the lift-off deck. Hold-down clamps on the windshield legs hold it in an upright position. The forward surface is decked with $\frac{1}{4}$ -in. mahogany plywood, and two runners are mounted on this so that their upper edges are level with the centerline of the deck to provide support for the windshield when it is in the down position. If you plan to do much running with the windshield folded down, it might be well to pad these runners and add small hold-down clamps to secure the windshield to the deck.

Use simple mortise and tenon joints when assembling the windshield frame, but don't glue those joints where the upper part of the frame attaches to the long lower leg. These should be fastened with oval-head screws and bedding compound so that the frame can be dismantled in case of glass breakage. After varnishing the whole unit, cover the underside of all edges with a

good quality weather stripping. This not only eliminates rattles, but protects the deck finish and makes a watertight seal.

If you wish to make a convertible top for the *PM Jet*, basic bow dimensions and mounting points can be obtained from Figs. 9, 10 and 11, Part I. The longest leg of the top bow is 33 in., the shorter leg mounted at right angles to it is 16 in. These dimensions will permit the top to fold over the windshield and lay flat on the deck. In order to provide sufficient surface for mounting the top fittings, you'll have to cut out a short section of coaming and replace it with a wider mounting block. Shape the upper edge of the block to match the coaming and varnish it.

Any awning maker should be able to make the top for you from the dimensions given here. Fit the forward edge with snap fittings and mount the male parts of the snaps on the front of the windshield frame. Eye straps mounted on the sheer shelf aft will take the snap fittings of the back strap. The top should be set with tension, but be careful not to make it too tight for it will tighten even further when wet and have a tendency to spring the windshield frame.

PLANS AVAILABLE

If you plan to build the *PM Jet* and would prefer to work from larger drawings than those included here, a complete set of plans on $2\frac{1}{2}$ x 3' sheets is available. To obtain these plans, plus a booklet containing the text and photos, send \$7.50 to Popular Mechanics Blueprint Dept., 200 E. Ontario St., Chicago 11, Ill.

Once you have completed the boat and are ready to put it on a trailer, the rear keel rollers must be adjusted to provide clearance for the skeg. One method is to make a deep wedge cut in the center of the roller so that the hull rests on the edges on the roller. If you can't provide sufficient clearance by cutting the roller, either substitute oversize rollers to hold the skeg or remove the rear roller altogether and substitute a pair of rollers mounted on the rear cross-member of the trailer as close to the keel as possible.

Don't think that the job is complete just because the boat is ready to be put in the water. The minute you pull up to the launching ramp with the *PM Jet*, curious bystanders will begin to close in and the questions will start. Try to be patient with these people. After all, you've got a versatile, exciting boat, and very likely it's the first jet many of them have seen. You'll just have to get used to being the center of attention. ★ ★ ★

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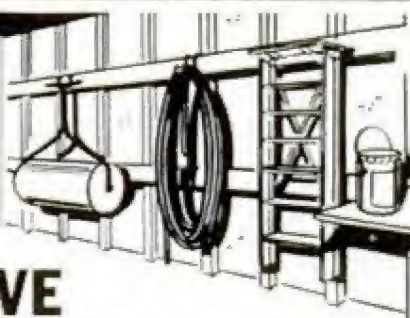
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Animated Easter Egg

(Continued from page 164)

To mount the moving disk, slip a plastic or cardboard washer over the axle wire and push the wire through the hole in the support so that it comes out the bottom of the shell. Using a pair of long-nosed pliers, make a right-angle bend in the wire as close to the outer surface of the shell as possible. Then make a second right-angle bend about 1/2 in. from the first so that it forms a crank.

Cutting the Base

Cut the basket base from 3/4-in. stock, shaping the inner cutout to fit the bottom of the egg and allow clearance for the crank. The stick support base has the same shape but should be cut from 1/2-in. stock. Locate the 2 1/2-in. cutout in the stick support base so that it will allow the crank to turn with approximately 1/2 in. clearance, and cut the slot for the dowel crank as indicated in the diagram, making it about 3/8 in. deep.

Make the dowel crank from a 5-in. length of 1/4-in. dowel, drilling a hole about 1/8 in. from one end for the wire crank. This hole should be large enough so the wire won't bind. Now fasten the basket and stick-support bases together with screws, slip the dowel crank into the slot and glue the base assembly to the shell with the end of the wire in the hole in the dowel crank. To complete the base assembly, glue a piece of light cardboard over the opening in the bottom.

Decorating the Interior

Before mounting the bunnies and house, paint the base and rotating disk green to represent grass. The inside of the upper half should be sky blue, with a horizon of trees and a few clouds added for extra realism. Cut the bunnies from heavy poster-board and the house from a slightly lighter cardboard. After coloring in the details, mount the bunnies with strips of cardboard folded to form triangular supports which hold them upright. Note that the corner of the house which extends over the rotating disk is cut about 1/8 in. shorter to assure clearance. Add trees or bushes of model-railway shrubbery or green-dyed sponge.

To assemble the egg, fit the collar of the upper portion inside the edge of the lower half and fasten the two halves with gummed tape. Cover the window at the top with a piece of transparent plastic cut from a refrigerator bag. Let your imagination run wild when decorating the egg. Use colored crepe paper, paints, fancy braids, felt flowers, beads, sequins—anything goes! ★ ★ ★

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Regulator and Generator Checks

(Continued from page 175)

Now, to check for overcharged battery or high-charging rate, first be sure the regulator is grounded to the chassis then, with the engine at 1500 r.p.m., disconnect the FLD. terminal from the regulator. If the charging rate drops, the regulator should be replaced. If there is no change, the generator field is grounded in the wiring or in the generator itself.

Generator High-Voltage Capacity

Now to check the generator high-voltage capacity, refer to the diagrams on page 175. Disconnect the regulator from the system and use a jumper wire to eliminate the regulator from the circuit. One thing about markings and position of terminals on regulators: Usually you'll see A, ARM or GEN on the terminal connected to the generator armature. B, BAT or AMM will be found on the car ammeter or battery connected terminal. But the positions and markings vary and one should make connections to the terminals by proper identification and not necessarily by duplication of the positions indicated in the diagrams on page 175. Now rev up the engine to give readings not exceeding 7.8 or 15.5, depending on whether you are checking a 6 or 12-volt system. Be careful not to exceed these readings as it is possible to send the voltage sky-high without the regulator in the circuit. In this test you are only making sure you have a basic minimum voltage. It's important when running tests to have parts at the correct temperature. Use either a standard regulator thermometer, Fig. 4, or improvise by taping a thermometer to the housing as in Fig. 5. Note the recommended temperatures in the table of specifications.

Generator Current Capacity

Generator current capacity can be determined initially by noting the generator amp. rating in the specifications for your car. But it is well to check to see if the generator is delivering the rated amperage. Use the jumper in the same manner as in the previous test. With the engine running turn on all lights, heater, radio and any other accessories. Then using an induction ammeter, Fig. 1, place the yoke over the wire running from regulator to battery. Now, increase the engine speed until the amp. reading just exceeds the generator rating. If the reading does not come up to the required level, then the chances are the commutator is glazed and must be cleaned.

Disassembly of a generator is quite simple and once you get it apart check the

condition of the brushes. Fig. 11 and the photo of brushes directly above Fig. 11 show what the brushes look like. If the brushes are badly worn (half their original length or less) and the commutator appears rough and burned, it will pay well to replace with a rebuilt generator. Otherwise, clean the brushes and holders, Fig. 11 and wipe the commutator with a dry cloth, Fig. 12.

If there is a need for regulator adjustment, use this sequence procedure: Run the engine for 15 minutes or so to bring the regulator to operating temperature. Have the thermometer attached at the time of starting the engine. When the temperature stabilizes take the reading, compare with the chart and note voltage settings in that temperature range.

Voltage Limiter

Stop the engine, disconnect the wire from the BAT(battery) terminal and insert a $\frac{1}{4}$ -ohm resistor, Fig. 6, between the BAT lug and the wire. Remember this wire is hot. Next, polarize the generator and hook up the voltmeter, observing polarity. Use either 8-v. or 16-v. range depending on battery voltage. Start the engine again and run at fast idle. The reading in the voltmeter should be within the range for the ambient temperature if no trouble exists.

If the battery uses water at a rather rapid rate, the voltage limit should be lowered somewhat. The meter reading will change when you remove the cover of the regulator. So, you compensate by taking the reading with the cover on and the cover off. Say, for example, the cover-on reading is 14.2 and the cover-off reading is 14.4 volts. By adjusting the regulator (there is a screw or lever for this purpose) you drop the cover-off voltage to a reading of 14.2. Then when the cover is replaced the voltage reading will be 14.0, a drop of 0.2 volt, which should normally achieve the desired result. When hooking in test instruments and making adjustments it is always best to remove the ground lead from the battery.

Cutout Relay

It's important to know when the cutout relay closes, switching the generator into the circuit. Start the engine and increase its speed gradually. The meter reading should increase, flatten out, then drop off slightly. The highest value reached just before the reading flattens out is the closing voltage. With the same hookup and with the engine not running a zero reading indicates the relay points are open, as they should be.

(Continued to page 210)

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Current Limiter

This vibrating switch which opens and closes several times per second can be checked with the induction ammeter by holding the latter over any regulator wire except the field (FLD) wire. Drain the battery somewhat by operating lights, radio and other accessories for 5 minutes, start the engine and increase speed until the reading levels off. The highest reading will be the limit of the generator. If the voltage and limiter readings fluctuate, the regulator points may be oxidized, resulting in high resistance and reduced generator output.

Cleaning Points

It's permissible to file the points, Figs. 7 through 10, but be sure to note the specs and use the correct file. Work carefully or you may damage parts. Remove any residues with crocus cloth, or a strip of linen dipped in carbon tetrachloride. ★ ★ ★

ADDRESSES of manufacturers and persons mentioned in this issue are published in the monthly Where-to-Find-It list, available free from Service Bureau, 200 E. Ontario St., Chicago 11, Ill. Send a stamped, self-addressed envelope.

Army Unveils VTOL Aircraft

Due to roll out of the hanger this month is the Army's—and the United States'—first vertical-takeoff-and-landing (VTOL) aircraft. It will be able to rise or descend from small areas and fly in excess of 500 miles per hour.

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Lawn Sweeper

(Continued from page 154)

just enough to permit inserting a shorter bolt at the center. Draw this bolt down but not so tightly that the angles are bent. Now, insert the shorter bolts each way from the center (you'll have to drill through the broomstraws blocking the holes) and draw the bolts tight by stages until the brush bundles assume the form shown in Fig. 6. Replace the unit in the assembly.

Height Adjustment

Now back to Fig. 1. The aluminum angle bar you see across the front of the pulled-apart unit is fitted with uprights of the same material. The lower ends of these are bolted to the ends of the wheel plates and the upper ends are joined to a locking bar on the left side (looked at from the rear) and to an adjusting bar on the right. The end of the locking bar is simply clamped under the washer on the handle-adjustment bolt, or it can be slotted $\frac{5}{16} \times 2\frac{1}{2}$ in. The upper end of the adjusting bar is bent at right angles to form a handle and is drilled just below the handle with spaced $\frac{1}{4}$ -in. holes for a bolt and wing nut. This arrangement provides for height adjustment of the brush.

Handle Bars

The handle bars, handle-bar supports and the trailing members which carry the dolly wheels are cut from hardwood such as oak. The handle bars are cut 46 to 48 in. long, ends are rounded and the corners are softened by sanding. The push bar is a 1-in. dowel and a $\frac{1}{4}$ -in. steel tie rod, threaded at both ends, joins the supports to the handle bars. A crossrail, or spreader, joins the trailing members. The dolly wheels are turned from hardwood. Machine bolts, with washers to protect the wooden hubs, serve as spindles. As detailed the push bar is about average height. It will not raise or lower. If you wish it to raise or lower then slot the upper ends of the handle-bar supports so that the push bar can be adjusted to any desired height.

And that's it, except that the grass catcher pictured in use with the unit on page 151 is inadequate for leaf sweeping. You'll need to make a much larger fabric hopper for leaf gathering. Attach the leading edge to the forward ends of the trailing bars with wire hooks and screw-eyes. ★ ★ ★

Send for your free WHERE-TO-FIND-IT list giving sources of supply or further information on articles in this issue.



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Start Your Vacation Home

(Continued from page 168)

Part II. Cutting them involves notching for the wall tie plates and sawing at an angle to form the ridge cut. You'll notice that no ridge board is used. Pairs of rafters simply butt endwise and are held in line with $\frac{3}{4}$ -in. plywood gussets placed on each side of the joint. Here, as with the rake panels, the 2 x 6 rafters can be assembled in pairs on the ground and lifted to the roof, or the plywood gussets can be added as the rafters are set 24 in. on centers and are toenailed to the tie plates of the outside walls and the central roof-bearing wall.

Prefabbing the Gables

Before all this can be done, four triangular sections which form the gable ends of the structure must be prefabbed. These are identical, each measuring 11 ft.-8 $\frac{3}{8}$ in., or half the total span of the end walls. In studying the framing of the rake panels detailed on page 169, you'll see that long bevel cuts are required at one end and that a short fill-in stud is added at the opposite end to form a pocket for the 2 x 8 built-up beam which is a part of the roof-bearing wall. The cutting plan for the gable sheathing shows how two sheets (4 x 6 and 4 x 8) can be cut economically to cover all four gable sections. These are keyed to show where they go, three pieces being used in each case. Notice that the sheathing is applied so it overhangs the bottom edge 1 in. This is done so it laps the top wall plate and also to form a waterproof joint when backed with a strip of metal flashing. Spikes driven through and into the top plate anchor the gable sections securely. The roof rake assemblies are supported by the gable sections, the former being centered over the latter and toenailed to it at each cross header.

Decking the roof can be done in the conventional manner, using roof boards or 4 x 8-ft. sheets and covering with asphalt shingles. Or you can add a roof of corrugated aluminum, fiberglass or other material. Here roof sheathing is omitted and 2 x 4 purlins (2 x 4 furring) are applied to the rafters 24 in. apart and lengthwise of the roof. Some difficulty may be encountered in providing adequate flashing around vent pipes and a chimney with a corrugated roof but it can be done.

To get your dwelling fully under cover you'll want to get the windows and doors installed as soon as possible. The openings in the prefabbed sections accept standard window units. Identical full-length windows are installed in the front and left elevations of the basic unit, whereas shorter half windows are used in the rear wall

of the house. The full-length units have fixed upper sash and a tilt-out casement sash at the bottom. The others are conventional double-hung sash. The two door openings are framed with standard jambs and headers and eventually trimmed with conventional casing, inside and out.

Whether you plan on adding the porch at some future date or not, you'll be wise to pour a 12-ft. slab if for nothing more than a patio for cookouts. Then if you should decide to add the screened porch, the floor will be ready for it. In studying the detail of the porch slab in Part II you'll note how a course of 12-in. block in the foundation wall provides a ledge to support the poured concrete. Besides being reinforced with welded-wire fabric, the slab is supported all around by concrete blocks resting on poured footings.

(To be concluded next month)

IF YOU WOULD LIKE TO KNOW

what the material cost will be to build this economy vacation home in your locality, the name and address of the lumber and building-supply dealer nearest you is listed on page 218. He is prepared to provide you with costs and further information on building the PM vacation home.

Man Warms Up This Cold World

Widespread use of fires, cultivation of the soil and the population explosion have warmed the earth's climate during the last 11,000 years, a scientist reports.

Dr. William Stokes of the University of Utah says these factors increased the amounts of carbon dioxide released into the atmosphere, saturating it and transforming it into something like a greenhouse which traps the warmth of the sun.

Fires, he said, apparently were set by primitive men and allowed to spread with no attempt made to put them out. Huge areas of Europe, Africa and North America often burned out of control.

GI Joe Eating Too Much Fat

Military medics have warned that too many soldiers are getting heart attacks, probably from eating a high-fat diet. They recommend cutting fatty foods in mess-hall menus.

Hardening of the arteries is the leading cause of death in the Army, and most evidence indicates a high-fat diet is a contributing factor.

Surveys of Army training camps showed that total intake was well above the recommended minimum, and that fatty foods—including butter, whole milk, cream, beef, pork and chocolate—made up more than 40 percent of the calories in the GI's diet.



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Working With Sheet Metal

(Continued from page 188)

types of metal containers, in sheet-metal duct work, furnace plenums — anywhere sheet-metal parts are to be corner-joined or in some cases, joined end to end.

Figs. 17, 18 and 20 picture a hand-powered unit known in tinshops as a rotary machine. It is supplied with interchangeable rolls and can be set up quickly to do crimping, beading, wiring, burring, and a number of other related operations. The machines generally are of two types, the standard unit, Fig. 17 and the deep-throated unit, Figs. 18 and 20. A wiring operation is pictured in Fig. 17 and beading and crimping operations in Figs. 18 and 20.

Bench Stakes

In the well-equipped commercial shops and also in school shops you'll probably find an assortment of stakes and a bench plate, Fig. 19, which illustrates only a few of the many types of stakes available for various types of sheet-metal work at the bench. One which is quite common is the double stake, Fig. 19, which is supplied with at least four heads, A, B, C, and D. Light sheet metals are worked on stakes and hollow mandrels, Fig. 19.

Fig. 22, details A, B and C, show how the single hemmed edge is formed on a bar-type folding machine, Fig. 21. Fig. 23, details A, B and C, show the forming of a double-hemmed edge. In one method of making a grooved seam by hand, the locks on the two pieces of metal are folded and hooked together and the seam closed with a hand grooving tool, Fig. 24. The seam is then flattened with a wood mallet. The seaming tool, Fig. 25, enables one to do a better job of working a seam. It comes in widths up to 6 in. or more and facilitates making a sharp, clean bend. It is adjustable for depth, or reach, which determines the distance from the edge the bend is made.

Cylindrical Forms

Cylindrical forms can be made by working the metal over a hollow mandrel with a mallet, Fig. 19, or with a slip-roll former, Fig. 26. Straight cuts in the light sheet metals of 22 gauge and thinner are easily made with tin snips of the regular pattern, Fig. 25. For making short-radius circular cuts in from an edge you'll need the hawk's-bill snips. For intricate patterns involving curved cuts of medium radius you use what are known as pocket circular snips (not illustrated). Aviation snips, Fig. 25, come right and left and in combination and are designed for intricate work on light sheet metals. ★ ★ ★

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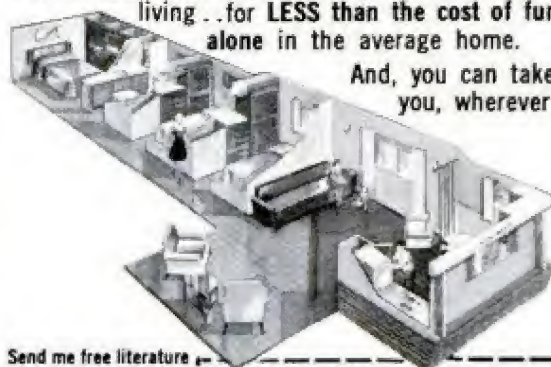
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(Continued to page 223)



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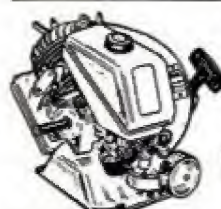
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219

Are These the New Airliners?

(Continued from page 142)

As helicopters with larger carrying capacities—such as the 65-passenger *Rotodyne*—become generally available, however, direct 'copter service between city centers 300-miles apart would become profitable.

Just as in the development of a practical 600-m.p.h. jetliner, the breakthrough in helicopters had to wait for a reliable gas-turbine engine. With their extremely high power-to-weight ratio, turbine engines develop the "oomph" to lift a loaded helicopter straight up without adding excessively to the load. Two General Electric CT58-110 engines, each producing 1250 shaft hp., drive the fore and aft rotors on the Vertol 107 and the main and auxiliary rotors on the Sikorsky S-61 helicopter.

Two Rotors Help Control

The 107's tandem rotors help maintain control during takeoff and landing in gusty winds. A pilot can use the dual rotors to compensate for the effects of wind drift during ascent or descent without turning into the wind. High winds with gusts up to 60 m.p.h. and the turbulence that swirls in and around Chicago's lake shore skyscrapers did not interfere with the 107's operations during the Lake Central test runs.

Instrument flights in foggy or cloudy weather are routine with a twin-engine helicopter. The Vertol 107, for example, is equipped with a dual "stability-augmentation system" that gives the twin-rotor aircraft handling characteristics equal to a fixed-wing airplane. Both the 107 and the S-61 include anti-icing equipment for flights under the most severe weather conditions.

Airborne navigation aids now provide the helicopter pilot with information to fly by night or in poor weather. These instruments are not basically new, but they have been adapted to the low speeds or hover, low altitudes during cruise, and vertical takeoff and landing flight paths. Once a foolproof altitude instrument is proved, helicopters will be able to land or take off on a vertical or steep-angle beam in weather that keeps the birds walking.

Already on the horizon is the compound VTOL (Vertical Take Off and Landing) transport. A number of designs are in the mill and are being tested, but the machine far ahead of the others in actual flight experience is the Westland (Fairey) *Rotodyne*. Kaman Aircraft Corp. holds a license to build and service the *Rotodyne* in the United States. It is scheduled for delivery beginning in 1964. Until Sikorsky produces its proposed 60-passenger helicopter, the

S-65, this British-made autogyro will be the largest of the new vertical-flight airliners.

The *Rotodyne* jumps VTOL aircraft into a bigger bracket by producing cruise speeds of 200 m.p.h. and a range of 300 miles carrying up to 65 passengers. Despite this increased performance, the *Rotodyne* will operate from heliports 200 feet square.

Combined Helicopter-Plane

With both fixed wings and a rotor, the *Rotodyne* combines the features of a helicopter and a regular airplane. The Rolls-Royce turbine engines drive air compressors through a fluid coupling and two propellers through mechanical transmissions. During vertical or hover flight, the air compressors feed pressurized air to small jet engines mounted at the tips of each rotor blade. There, fuel is injected and burned to develop thrust, much the same as turbojet engines powering 707s and DC-8s. Instead of being driven from the huge hub, the rotor is turned by the tip engines.

After takeoff, the rotor accelerates the *Rotodyne* into cruise. At a transition speed, the compressors are gradually declutched and the engines begin powering the regulation props. As more forward speed is attained, the rotor tip engines are extinguished and the props drive the aircraft in cruise. For landing, the reverse sequence returns power to the rotor.

Major trunk-line airlines have long known that trip lengths under about 300 miles are money losers when flying jetliners. With the *Rotodyne*'s 65-passenger capacity available, the airlines could shift short-hop operations away from the big outlying jetports to downtown heliports and relieve jetport traffic congestion while providing time-saving convenience for intercity travelers. For example, a trip from the center of Chicago to the center of Detroit now takes three hours and 36 minutes. The same trip by *Rotodyne* would take only one hour and 38 minutes allowing the same time for boarding and picking up baggage. (See table on page 141.)

Air-taxi runs and short hops by helicopter over the traffic-crowded streets that strangle our cities are routine today. With the Vertol 107 and the S-61 available, helicopters will expand to the suburban-population cities up to 200 miles from major jetports. When the *Rotodyne* appears in quantity in 1964, city center to city center traffic between metropolitan areas up to 300 miles apart will become routine—with travel times slashed in half. Just as the jetliners have made the world 40 percent smaller, big, fast helicopters will shrink countries within the world. ★★★



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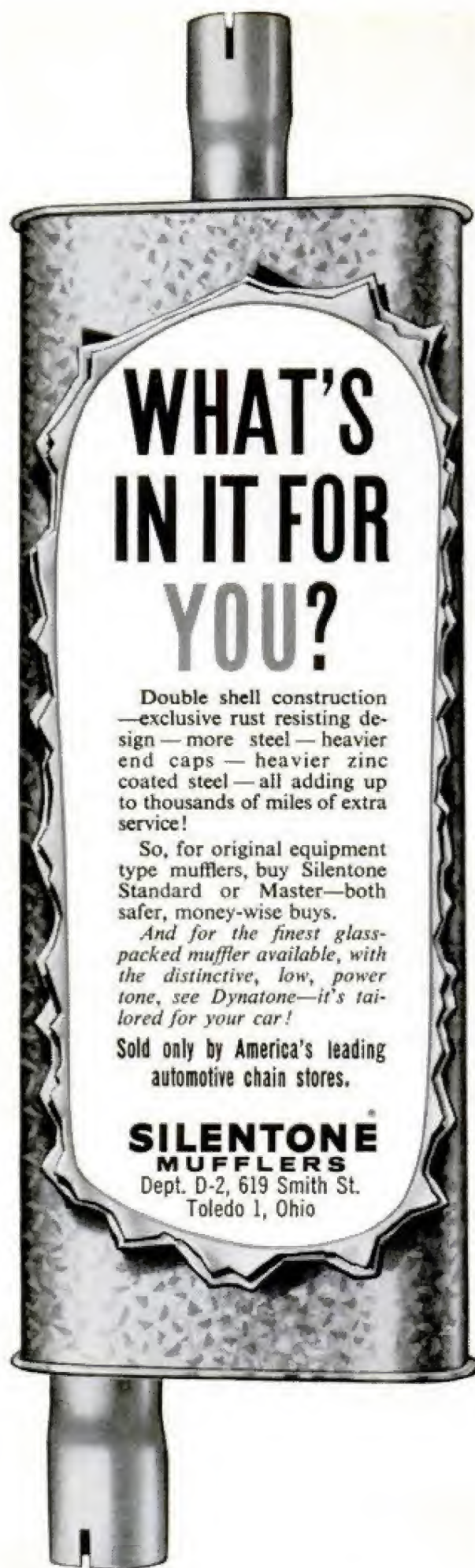
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Cries of Doomsday

(Continued from page 115)

area, and the intermediate area beyond.

Agronomists at the University of Minnesota are trying to develop varieties of wheat, barley and soybeans that could be grown and eaten safely despite a fallout.

General Electric says its scientists believe a new refrigerator-sized unit under development for salt-water conversion will make drinkable water from any contaminated supply.

In Beltsville, Md., the U. S. Department of Agriculture says it has removed up to 98 percent of strontium 90 from milk and is perfecting the method on pilot-plant scale.

Already emergency plans for agricultural problems have been organized down to county levels. Slaughtering, sugar making, oil-seed crushing, canning and other processing industries are fortunately located out near the farms today.

There will be distribution delays. Land line communications will be out. Many rail terminals and airports will have been demolished and so will rolling stock in city yards. Oil fields and refineries may add to the "denial time," as the experts call it. But they insist there will be enough surviving transportation equipment and fuel stocks to meet emergency conditions. Interstate transport will recover in a hurry since much overland trackage and highway will remain intact. Probably one of the first outside things you'll see in your town will be a government interview trailer from one of 2000 state employment services set up to put people back to work.

How will these plans be carried out? Suppose Washington is wiped out?

Second Government

A second U. S. government is already in existence and operating with a skeleton staff in a hardened underground control center. Seven more such centers scattered across the country are planned. More than 1000 government agency relocation and safe record sites have been completed in an area stretching for 300 miles west of Washington. Also deep underground, tied in with foolproof communications links with all major centers around the country, is the national damage assessment system. This monster is a high-speed computer that swiftly locates and identifies surviving resources and computes casualty estimates based on the weapons and attack pattern.

Chances are that if nuclear war came, the President, or one of his 12 successors, would establish martial law. More than 26

(Continued to page 224)

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states also have alternate government plans and more are following suit.

The hard fact is that it takes time to put big national—or even state—machinery in motion. For the first month or so after an all-out nuclear attack, you'd be out there (fallout permitting) helping the town fathers ration food, restore utilities and services, care for the sick and dying, curb looters, house refugees—or doing whatever job your talents qualify you for.

All told it would be a busy life for awhile. If the retaliation effort forestalled invasion, most experts estimate it would take 10 or more years to clean up the mess. Whether it would all be worth surviving depends on you.

Islands of Protection

The fact is that, with good fallout protection, even millions of people located inside bombed cities could survive the entire ordeal, due to natural islands of protection. Thermal radiation and immediate radiation from a blast travel in a straight line. Even some buildings close in, but shielded from direct line of sight to the fireball by intervening hills or other buildings, could remain relatively undamaged. During Nevada Flats tests, a loaded propane tank less than half a mile from ground zero re-

mained intact because it lay in the shadow of a concrete block building. In Hiroshima, thermal radiation burned patterns in the streets around shadows cast by stone fences and steel stanchions.

"If I lived in New York's heart, I wouldn't write myself off," says a Department of Agriculture expert. "No one can predict accurately the targets an enemy would pick. He might just need all those harbors—or think he did. We do know that certain military bases—not cities—would be the really prime targets. And no one knows what the pattern of hits and misses will be. In some places the suburbs might get the full brunt of what was meant for downtown. And if it turned out that all you had really needed to save yourself and your entire family for a few days or weeks, was a concrete umbrella to keep radioactive rain off you—you might be pretty sorry."

Even without major cities, rural areas would be able to survive, an OEP executive points out. "Russia's greatest effort would fail if we decide we want to survive," he says. "People would be our greatest asset. Comeback would be no worse than the job that faced our forefathers in carving this nation out of the wilderness.

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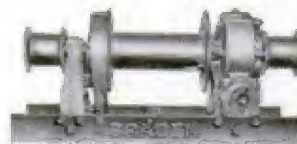
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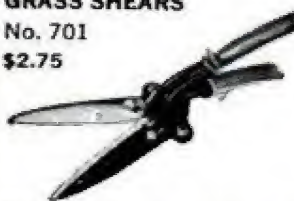


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Electric Touring Car

(Continued from page 160)

The drive assembly, Figs. 2 and 6, works off the right rear wheel. Mount the sprocket coupling concentric with the outside diameter of the wheel and attach the sprocket. Use the procedure mentioned above to mount the wheel.

The power plant for this little electric car can be either a converted government-surplus electric gear motor (\$16-\$20) or a converted 6-v. automobile generator having either two or three brushes. To convert the generator, remove the third brush, if one is present. Leave the grounded wire intact. Likewise, the other brush wire (running outside or to a terminal on the case) should be left intact. The fields are connected by soldering, and the two field wires run outside or to terminals on case.

Position the motor on the hanger rod which is inserted in holes in the frame, and make sure the sprockets are in line before installing the chain. Mount the motor adjusting rod to the motor and frame, allowing 1/2-in. of slack in the chain (measuring half-way between the sprockets).

Forming Body

All the body parts, Figs. 9 through 12, are cut from 22-ga. sheet metal using a pair of heavy tin snips or a hacksaw. To bend the flanges, clamp a 2 x 4 along each bending line and use a rubber mallet to make a neat even angle. The dash panel should be spot-welded or riveted to the hood. Fasten the seat-panel enclosures to the fronts of the formed seats, and mount the eight seat supports inside to serve as braces for the cushions. These cushions, Fig. 9, are made by cutting two plywood bases, padding them with 1-in. foam rubber and covering them with plastic fabric.

Assemble the radiator, hood, dash panel and bulkhead as one unit. Next, assemble the seats and either rivet or spot-weld the fenders in position. Paint all the body sub-assemblies with one coat of metal primer topped with a coat of glossy black enamel. The wheels can be painted gold or red.

Now comes the final assembly. Place the floor pan in position on the frame and install the hood unit, seats, fenders and steering shaft. Mount the brake handle through the elongated slot and adjust it to the brake rod. The battery sits under the front seat and is held in place with angle brackets. To complete the car, wire motor, lights and accelerator button to the battery, Fig. 7.

Individual parts, complete kits and large-scale plans for this sidewalk car are available from Ma Jo Lekri Kars, Box 3134, Glenoaks Station, Burbank, Calif. ★ ★ ★

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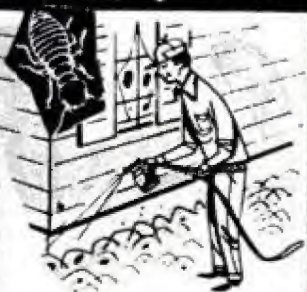
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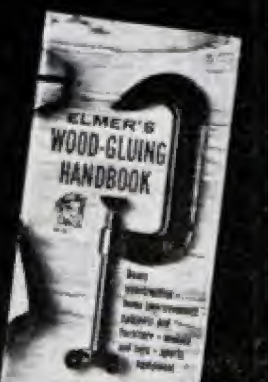
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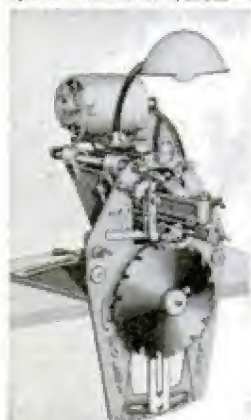
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Win the War on Weeds

(Continued from page 135)

Tests show it may remain active in the soil for long periods.

TBA is effective against a number of weeds that other herbicides have failed to control. It has been used with some success as a pre-emergence spray for wild garlic, annual weed brome grasses, quackgrass, some species of brush and perennial weeds.

EPTC has been tried successfully as a pre-emergence herbicide to control annual grassy weeds and many broadleaved weeds in forage legume seedlings.

DMTT is a volatile soil sterilant that can be applied without the use of airtight cover over the soil for weed control, soil fungi and nematodes. It may be applied as a dry powder or as a spray.

SMDC is basically the same type of soil sterilant as DMTT. If used in liquid form, it can be sprayed onto the soil surface, then soaked into the soil with water. Or it can be mixed with the surface six-inch layer of soil, thoroughly wetting the surface to provide a gas seal. Allow 7 to 14 days after applying SMDC before planting crops.

MCPB has shown promise for post-emergence control of broadleaved weeds in cereals underseeded with certain forage legumes, on forage legume seed production fields, in establishing pure stands of forage legumes, and on flax crops.

To develop new weapons against weeds, the Beltsville scientists conduct dozens of physiological tests. For example, one scientist used a Warburg respirator to determine what effects new herbicides had on the respiration process of a wheat plant. When a herbicide slowed down the plant's "breathing," it was tagged at once as unfit for use.

Right now, in cooperation with equipment manufacturers, the researchers are working on novel vehicles designed to destroy weeds on experimental plots. One of these, a hand-operated sprayer, uses a compressed air storage tank to supply pressure. It shows promise for weed control of food crops, specifically for eliminating ragweed, crabgrass and mustard.

The scientists take pains to point out that the new herbicides can work no magic on lawns which are improperly cared for. A weedy lawn is a starved lawn, they explain, and good plant food is needed to get good grass.

Readers desiring more complete information on the herbicides described in this article are urged to write the Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Md., and ask for a copy of ARS 22-46, "Suggested Guide for Chemical Control of Weeds." ★ ★ ★

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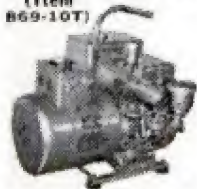
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City _____ Zone _____ State _____

Owners Report on the Falcon

(Continued from page 95)

"The brakes are squeaking."—Louisiana oil-field worker.

"I'm having trouble with my carburetor. It doesn't take the gas when I step on it."—New Hampshire allowance specialist.

"The only trouble I have had with my Falcon is the carburetor. The Ford people are going to replace it."—West Virginia mechanic.

Over the years, faulty carburetion has been the biggest problem with new cars. Conscientious dealers like his seem to be the only answer.

"I am very disappointed in the gas mileage. My 101-hp. station wagon averages just over 15 miles per gallon."—Vermont painter.

"We think we should get more mileage; salesman used *that* as a sales pitch (he said up to 26 miles per gallon)."—Iowa building contractor.

A salesman's talk of such exceptional fuel mileage should be taken like a politician's pie-in-the-sky campaign promises.

"I think they should put 14 or 15-inch wheels on it for better tire wear."—Maryland cheesemaker.

We doubt his concern because none of the many multiple-Falcon owners have reported undue tire wear.

"The 13-inch tires are too small for hot desert highway driving."—Nevada engineer.

Back on the positive side, the second group of best-liked features, numbers six through ten, is listed by frequency of mention.

"Being tall, I was not supposed to be able to sit inside with my hat on, but I can do so nicely. I couldn't do so in expensive models."—Pennsylvania bank employee.

"It has plenty of room for my family and serves our needs."—Oklahoma rancher.

It's a bit scant on rear seat legroom, but that's where the kids sit, so it's OK.

"I'm 6 feet 3½ inches tall, and I don't have to remove my hat."—D.C. pharmacist.

"I also like my bigger engine for passing and quick takeoff."—Indiana housewife.

"The 85-hp. motor is adequate for normal driving."—Wisconsin foreman.

His "normal" is pretty conservative.

"It cruises at 60-65 m.p.h. smoothly and easily."—California telephone worker.

"Like plain styling; it's not a spaceship."—Massachusetts electrical worker.

"Heaven help us if we get cars that look like Friendship 7!"

"I like the beauty of appearance of my Squire."—Vermont lawyer.

"Like the over-all shape of the Ford Falcon. It is a little car that has the lines of bigger models."—Arizona bookkeeper.

That's the secret of success—think big but cost small.

"I like the sweeping view allowed by the windshield and back window."—Florida nurse.

"The damned thing starts in cold weather!"—New Hampshire retiree.

"For cold-climate owners, the hand choke is most efficient. Please leave it on."—Massachusetts mechanical engineer.

We second the motion!

Here are complaints, numbers six through ten, in their order of mention, making up the second group on the negative side.

"The Falcon is hard to control in the wind."—New Mexico electronics technician.

"Wind has a great swaying effect on the car."—New Jersey aviation electrician.

This seems to be the price one must pay for the light weight that gives economy and happy handling.

"Gas tank filler pipe should be moved to a straight position, as gas spills over both car and chrome."—Rhode Island printer.

Too true, but filler pipes on fender side (behind a door) hog trunk space.

"There are a few squeaks that should not be in it."—Missouri farmer.

"Like all Fords I have driven and owned, it rattles. Why can't Ford make a tight car like GM?"—Texas student.

Wonder why he keeps on buying Ford products?

"There are too many rattles in dash panel area."—Michigan engineer.

"The starter grinds when released."—Colorado clerk.

"A little sluggish on hills when on a long pull (101-hp. station wagon)."—Nevada restaurant owner.

"I would like to see the ratio changed on my 101-hp. Falcon because it roars at 80 m.p.h."—California serviceman.

Overdrive, if only it were offered, would solve your problem as well as that of the Nevadan above.

Tossing a final bouquet or two, here is the last group of best-liked features, eleven through fifteen, in order of their mention.

"Falcon handles better than any other car we have ever owned, and we've had over 30 years of experience in rugged New

(Continued to page 232)



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save gas, oil, tires
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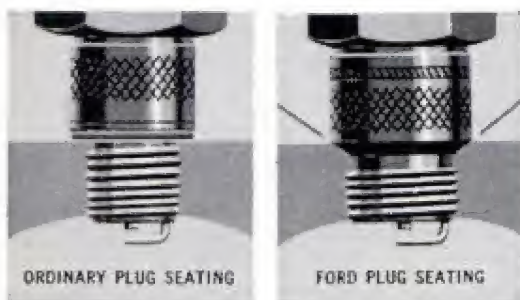
Moreover, Ford's outstanding reliability gives you more lasting protec-

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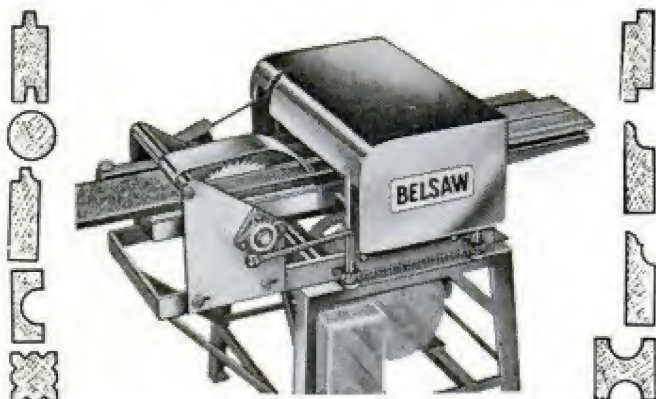
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England winter driving."—Vermont teacher.

"It is the greatest on snow or ice—better than any big car I have ever owned."—New Jersey housewife.

According to many owners, Falcon's the next best thing to a pair of snowshoes.

"It holds the road beautifully at 70 m.p.h. and hugs the road on curves."—New Mexico executive.

"My Falcon holds the road well at 80 m.p.h. in turnpike driving."—Ohio teacher.

"Very easy accessibility to motor as regards repairs!"—Massachusetts airline worker.

"I like the 6000-mile oil change and 3000-mile lube change."—Michigan die setter.

We still think that you should change oil more frequently in winter.

The final group of complaints follows—eleven through sixteen—in their order of mention by owners.

"I don't like the glare on the windshield above the dash at night."—Kansas minister.

SOURCES OF SUPPLY and information on articles are published in the free **WHERE-TO-FIND-IT** list. Send stamped, self-addressed envelope to **SERVICE BUREAU, 200 E. Ontario, Chicago 11, Illinois.**

"I would like to see different gears in the automatic transmission for faster takeoff."—Georgia mechanic.

So would we. What Falcon needs most is an automatic box with an intermediate gear for acceleration and hill climbing.

"The starter motor failed, and the vacuum line to the transmission broke."—Wyoming airman.

Vacuum-line broke on PM's test car, too. We would fix it with a short length of rubber hose to soak up vibration.

"I had to replace the generator and also the brakes, which are bad again."—Ohio judicial secretary.

"Brakes grab at slow speed when they're wet."—Pennsylvania machinist.

"In city driving it is tiresome to shift from high to second at 15 to 25 miles per hour."—Alabama hospital worker.

"All four shock absorbers had to be replaced!"—Wisconsin agricultural inspector.

A grand slam maybe?

"The windshield leaks very badly."—Mississippi farmer. ★★★

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The Celebrated Jumping Frogs

(Continued from page 109)

the water, one of the pararescuemen swims out to retrieve it. Then, together, they position it under the spacecraft, securing it firmly in place and, when all the kinks are out, inflating it. With the capsule now safe from sinking, they get the astronaut out and render whatever aid seems necessary.

If undamaged, the capsule could probably float indefinitely. However, once the hatch is opened to get the astronaut out, water can flood it and sink it. This happened to Capt. Grissom's capsule. So the pararescuemen use the extra floatation device.

All of which raises a question. Why wasn't this system used on the Grissom shoot? A frogman gave the wallflower's perennial answer, "Nobody asked us."

The Mercury space program is under the direction of the National Aeronautics and Space Administration, a civilian agency. In all of the space shots so far, it has assigned the Navy the task of recovering the capsule in the primary impact areas (areas about 50 miles wide and 100 miles long), and it has assigned the Air Force the task of recovering the capsule anywhere else.

The original Navy system, using Marine helicopters and crews, lifted both the astronaut and capsule directly out of the water without any extra floatation gear. It worked to perfection after Comdr. Shepard's flight but, following the loss of Grissom's capsule, the Navy apparently abandoned the system and deployed both surface vessels and frogmen into the impact areas for Col. Glenn.

It's still interesting to speculate, however, whether the Grissom capsule could have been saved if the frogman system—of putting a float under the capsule first, then getting the astronaut out—had been used.

Wallflowers or not, the pararescuemen believe they're on the right track for perfecting a system that will recover almost any future spaceman or spacecraft.

Meanwhile, they are only one element of the Air Force's celebrated Air Rescue Service (ARS), which has its headquarters in Orlando, Fla., and units scattered—on 24-hour call—throughout the world. While part of its present assignment is obviously wrapped up in the future (space), ARS is justly proud of its past which has made it one of the most highly decorated and widely respected units in the world.

Conceived in the tragedies of World War II—the tragedies of downed airmen and others caught behind the lines who could not be rescued because there was no really consistent system developed for doing so—the Air Rescue Service was actually born

(Continued to page 236)

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SUPER DRILL GRINDER
Sharpens round shank drills like new, using hand or power grinders. **\$2.95 PPD.**

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JOINT AND SHARPEN ALL SAWS

SUPER FILER NO. 11 joints and sharpens hand and circular saws 6" to 10" with all teeth correct in height, depth, pitch, bevel. When file hits steel roller, teeth are finished. Saw runs true with no side pull. Includes 8" file. **\$9.95 PPD**

"TRU-CIRCLE"

Saw set automatically sets teeth at 10° or more... **\$2.95 PPD**



A. D. McBurney, 5908 Hollywood Blvd., Hollywood 28, Cal., Dept. A-42

following the war in 1946. Its primary duty was, and is, the recovery of downed combat airmen, and its primary piece of equipment was the then recently developed helicopter. It still has helicopters (the Sikorsky H-19, Boeing H-21 *Workhorse* and Kamam H-43 *Huskie*), but has since added amphibians (the Grumman SA-16 *Albatross*) and, of course, the jumping frogs.

It has also added many other duties.

To put it in its simplest terms, the Air Rescue Service flies whenever and wherever it is needed—in peace or war. In its 16 years of existence it has answered distress calls—airlifting survivors or dropping medical supplies and equipment—during and after such natural disasters as floods, earthquakes, hurricanes, typhoons, air crashes and shipwrecks, and such man-made disasters as the Korean conflict.

It has rescued from certain death more than 8000 persons, many of them non-Americans, and has aided more than 50,000 while flying nearly 45,000 missions. Individually and collectively, Air Rescue Servicemen have probably created more good will abroad than any other Americans.

As early as February, 1947, ARS men established an emergency airlift when the Mamore River in Bolivia flooded, wiping out native villages in a mountainous region covering an area of more than 100 square miles. Under these hazardous conditions, they evacuated hundreds of natives. When it was over, their commanding officer was awarded Bolivia's highest decoration, the Condor of the Andes, the equivalent of our own Congressional Medal of Honor.

In 1953, thousands of persons were saved by ARS men in the disastrous floods in the Netherlands and England. Dutch Queen Juliana and Prince Bernhard were flown over the stricken areas by ARS aircraft and, in England, probably the greatest single act of heroism was performed by Airman 3/C Reis Leming who, in spite of the fact he couldn't swim, pushed a rubber life-raft into the swirling waters and, in three trips, rescued 27 persons unaided. He collapsed after the third trip. Queen Elizabeth granted him the George Cross, the first foreigner in history to receive it.

Snatched From the Rigging

ARS men rescued stranded Japanese seamen following a typhoon. In one of these rescues, the helicopters just managed to save the crewmen who were clinging to the rigging of their sinking ship. The hull had already sunk from sight.

Perhaps the outstanding sea rescue occurred in 1954 off the coast of Red China. A British airliner, bound for Hong Kong, had been shot down without warning by

Communist jets. Nine of the people aboard were killed, and the survivors were afloat in a life raft within the 12-mile limit set by the Communists as their international boundary. Red China radios warned that all "war planes" which entered the area would be fired on.

An Air Rescue *Albatross*, stationed at Clark Air Force Base in the Philippines, flew to the rescue. The pilot, Capt. Jack Woodyard, ignored the warnings and, after locating the raft, set down in the water and taxied alongside it where his crew gathered the survivors aboard. One of them, a young Chinese girl, died on the flight back.

All of the above rescues, remember, were of non-Americans and outside of the normal line of duty of the Air Rescue Service. Most of its work, in addition to salvaging satellites and spacecraft, is directed toward rescuing survivors of U. S. military and civilian air crashes and assisting in rescue operations after domestic disasters such as the spring floods in the Middle West and the summer hurricanes on the East Coast.

Its finest work of all, perhaps, was done during the Korean War. No other unit was cited for bravery as often. Perhaps the most outstanding example was the night rescue of an F-51 pilot who had been shot down and had parachuted into the Taedong River in enemy territory.

Blind Rescue Under Fire

Knowing only the approximate position of the downed airman and under continual enemy fire, Lieut. John Najarian landed his *Albatross* on the river without lights and with only a vague idea of the Taedong's depth and width. Taxiing through the dark, he saw a blinking pinpoint of light and headed toward it. It was the downed pilot, using his emergency flashlight. The pilot was gathered aboard and while the shore batteries continued their fire, the takeoff was made in total darkness. Najarian could see neither the water nor the horizon in the blackness. It was successful, however, and, after clearing some high-tension wires at a bend in the river, with the flak still bursting around his plane, Najarian headed for home. For his heroic effort, he was awarded the Distinguished Service Cross, this nation's second highest medal.

As the wise man said, the past is but prologue. The Air Rescue Service has a noble past, but perhaps it's only a prologue to what it might now accomplish as it trains itself for the space age. These rescue artists, who don't always get the glory but take a perverse pride in saving those who do, will now be waiting around to welcome travelers from space and carry them safely home. ★ ★ ★



"So there I was
with my trusty..."

Lucky fisherman: compact car . . . compact sailfish . . . new compact Sea-Horse motor.

NEW JOHNSON COMPACTS

Lighter...leaner...same famous Sea-Horse dependability

Smaller, sleeker, slimmer and trimmer. It's a '62 Johnson *Compact!* Designed for function, not for flash. Shown above is the 18 hp model. Below and to the right are the 10 and 5½.

And dependability is their middle name. A cushion hub prop that protects against stump bumping. Thermostatic cooling for smoother any-weather performance. Add a super silencing system, full gearshift, plus corrosion proofing and you've got the best fishing news this side of a bass bed.

Your Johnson dealer's in the Yellow Pages. '62 Sea-Horse motors include: Electramatic 75's and 40's; a budget-bomb 28; and a 3 that thinks it's a 5½. Send for free '62 catalog.

Johnson Motors, 1294 Pershing Rd., Waukegan, Ill. Division of Outboard Marine Corp.

Well over two million quiet Sea-Horse motors prove **JOHNSON DEPENDability**



'Sputniks' Orbit the Supermart

(Continued from page 88)

"We asked a salesman for a \$1000 calculating machine if there was a simple way of comparing such amounts on his machine . . . he went away shaking his head."

"What is the price per ounce of this 6½-oz. can of tuna at two for 63 cents, compared to this 9¼-oz. can at 43 cents?" a woman wanted to know. "Only an expert with a slide rule or abacus can figure out comparative costs."

"Most of us are too busy to take a computer, a slide rule and an MIT graduate to market and figure out what we are buying," another witness remarked. (Recently a simplified supermarket calculator that figures out the cost per unit was put on the market by Best Buy Products Co., P.O. Box 82, Decatur, Ill.) — *D/EE PUSTPAID*

Several people touched on the use of "bargain labels" that claim "5 Cents Off Regular Price" or "Special Offer, 30 Cents Off." When such labels are printed by the hundreds of thousands it's silly to think that a special bargain is being offered. The "special" price becomes the regular price, even though the original price had been increased just to permit the reduction.

Chemicals or Foods

One witness testified that some packages contain far more chemicals than foods. He cited a brand of "Clear Chicken Instant Soup" that listed its contents: Salt, dextrose, monosodium glutamate, dehydrated onions, chicken fat (which is not chicken meat), starch, dehydrated vegetables, spices, tricalcium phosphate, butylated hydroxyanisole, propyl gallate, plus citric acid in propylene glycol.

"A correct name for this product," he said, "if one assumes that its sale should be permitted at all, would refer to it as an imitation soup mix."

One of the most common complaints was the difficulty in finding and reading the net weight declaration on many packages. Some declarations appear in tiny print, others are virtually concealed by other means. Instances were cited of labels that used to show the net weight in large print on the front of the package, and that have been replaced by "modern" labels in which the statement of contents is printed in small type and in an inconspicuous place on a side or the back of the package.

Sometimes the declaration blends in with fancy artwork, sometimes it is blended into the background. "Here's an example of a package that has its contents marked in yellow on shiny gold foil that glares in your eyes," one witness declared while holding

up the package. "I would dare the committee to find the ounces on that package. It is there."

Is this sort of thing against the law? The federal Food, Drug and Cosmetic Act requires that the label of a package carry an accurate statement of the amount of the contents, prominently and conspicuously placed. Somehow that part of the law has been stretched out of all recognition.

Another complaint was about slack filling. A housewife said she is always disappointed when she finds an inch or so of air space in the top of a box, even though the contents lives up to its stated weight. She figures that the packager is trying to fool her with an oversize box.

There are exceptions to this, as I learned myself. I opened a box of powdered soap and found more than an inch of air space inside, then I poured the contents into a large pan and back into the box again. I had a lot of soap left over when the box was full and had to cram in the rest of it. In this case it was apparent that the contents had jiggled into smaller space during shipment.

Instances like these are some of the reasons for Senator Hart's hearings on packages and labels. After reviewing all the testimony, his subcommittee will decide whether present laws need to be strengthened or left as they are, or whether some entirely new laws are needed.

Tougher Laws

Senator Hart favors tougher laws. "I felt that there were exhibits that we saw that were within the law and wrong," he said. "It follows that additional legislation is desirable."

Some of the food companies are not waiting for new laws. Running scared, they have already made adjustments in their packaging. One large company sent a memorandum to its various divisions ordering net-content statements to be "clearly, prominently and conspicuously shown on the main display panel," and that no type below a certain size be used.

Another supermarket chain announced it is changing the position and increasing the type size of markings on its own private brands "wherever there is a possibility of a question being raised."

Meanwhile, is there anything you can do about all this yourself? Of course there is! You can complain to your grocer about packages that you believe to be deceptive and ask him to pass on your complaint to the manufacturer. You can write directly to the manufacturer as well. And you can stop buying a particular brand and shop for others. ★ ★ ★



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Father's Day • Graduation • Birthday 3/8" DRIVE ALLOY STARTER SET

Lots of space for keeping other tools in the heavy duty hip roof box. Removable tote tray with exclusive tool organizer. Tools are American made genuine alloy steel, for a lifetime of use. Complete

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Retail value \$1.85

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SCHILLER PARK, ILLINOIS

That sunburned look? If the peeling paint job on your house has it, there are ways to find and correct the moisture conditions which make the paint peel. The May issue of Popular Mechanics contains a trouble-shooting guide on this subject.

ROCK HOUNDS THUMLER'S TUMBLER

- Imparts gem-like polish to 3 to 10 lb. rocks.
- Simple—guaranteed—no better at any price.
- If your dealer can't supply, order direct \$18.95 postpaid. (Set of 2 grits, 1 polish, \$1.20 additional.)



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DC JET GENERATOR ARC WELDING KIT Complete with GE Type CM-77 Generator (30 volts D.C., 400 Amp., 3000 RPM up; ampere rating is for continuous duty, intermittent amperage is 500 to 600 amps.), also 2 rheostats, 1 voltage reg., 1 voltmeter, 1 electrode holder, 1 welder's mask, 1 toggle switch, 10 lb. vacuum packed 1/8 in. welding rods, pair welder's gloves & spline coupling. All units guaranteed pre-tested. Approx. GOVT. COST \$700. All items, now only **\$64.50**.

*G.E. Generator noted above can be purchased separately. Makes deluxe heavy-duty welder comparable to the finest commercial welders available. Wt. 90 lbs. Approx. GOVT. COST \$600. Gen. alone—**\$49.50**.



ELECTRIC STORAGE BATTERY WINCH

New, improved model contains heavy-duty, 2-way drum switch. Fully reversible heavy-duty, two-speed motor, 160 to 1 gear reduction. Ball bearing construction throughout. Drum will handle 70' of 1/4" cable. Can be used on 6, 12, 24 V. battery. Lift cap, 2000 lbs. plus. Ready to install & operate. 19" long x 9" wide x 8" high. For jeeps, trailers, boats, trucks, etc. Complete with mounting flange safety load locking brake. Shpg. Wt. 60 lbs. Approx. GOVT. COST \$400. NEW. Model E. **\$49.50**.

DELUXE MODEL ED Same as above but with extra heavy base & outrigger support bearing. 200' 1/4" cable spool capacity. NEW. **\$69.50**.

"SUPER 9" 200 AMP WELDING KIT With Deluxe accessories consisting of one 200 AMP. Gen., adjustable helmet, electrode holder, ammeter and shunt, rheostat, toggle switch, voltmeter, voltage reg., 1 pr. heavy-duty welder's gloves and 30' cable. All units guaranteed pre-tested. Approx. GOVT. COST \$500. Most items new—all perfect, **\$27.50**.



HEAVY-DUTY WELDING CABLE—Size

No. 1/0. Use as positive and negative electrode cables for arc welder. Rubber jacketed copper cable. Handles up to 300 Amps. Extra Flexible, multi-stranded. Terrific value. 50' lengths. **\$24.95**



FRESH WATER SYSTEM PUMP—For boats, campers & trailers. Output 10 to 200 gal. an hr. Variable rheostat controls output. 1/2" pipe thread into bronze impeller housing. 12 V.D.C. Radio noise filter. 5.2 amp. draw. Explosion-proof const. Shpg. wt. 11 lbs. Complete with mounting instructions & wiring diagram. Approx. GOVT. COST, \$200. NEW. **\$10.95**.

225-1 REDUCTION GEAR For beaching boats, winches, hoists. Ideal motor in golf or boy's electric car. DC motor and clutch. Easily reversible wiring diagram furnished. Hi torque. Runs at 47 RPM on 12 V. DC; 105 RPM on 24 V. DC. Approx. 20 RPM on 6 V. DC. All ball bearing const. Shpg. wt. 65 lbs. Approx. GOVT. COST \$300. **\$13.50** Matched splined gear—**\$3.00 ea.**

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The most useful gasoline-powered saw you can own. Rugged power for felling 20" trees, smooth cut for carpentry or pruning, perfect for firewood. Safe to use, even on a ladder. Send coupon today for free plans, literature and the name of your nearest dealer.



Plans for log cabin also shows how to build duck blind, rustic furniture, boat dock, fences, etc.

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Dept. PM-3, 207 E. Broadway, Louisville 2, Ky.

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Address _____
City _____ Zone _____ State _____

Owners Report on the Pontiac

(Continued from page 99)

six through ten in the order of frequency mentioned.

"I like the full-vision windshield with its effective washers and wipers."—Texas retiree.

"Low sloping hood permits clear vision of the road ahead."—Iowa warehouseman.

"I like the wide-track stability."—Montana electronics specialist.

Wider tread does help stability yet costs little or nothing extra. Pontiac has widest tread in the industry.

"This wide-track car stays on the road better."—Missouri salesman.

"It's comfortable on trips and we are both tall."—New Jersey machinist.

"Everything inside is real comfy. There is plenty of room."—Nebraska secretary.

"It looks smaller than the '59 Catalina I owned."—Missouri salesman.

It is smaller; two inches shorter, two inches narrower, one inch lower, two inches shorter wheelbase but roomier inside. That's progress.

"Very well satisfied with the performance and mileage of this car."—Oklahoma auto repair man.

Back to complaints, with numbers six through ten, in their order of frequency.

"Workmanship in fit of body parts could be better, but Pontiac is as good as any or better."—North Dakota insurance man.

He's right, Pontiac is as well-built—maybe better—as any car in its price range, but there's still room for improvement.

"Sloppy assembly job—many small items aren't put together properly."—Mississippi personnel director.

"I don't like the heating system. It has a center outlet and keeps the driver's right foot hot in highway driving. Also very uncomfortable for middle passenger in the front seat."—Virginia hosiery mill worker.

"The heater fan motor should have separate switch."—Maryland salesman.

Definitely. You can only defrost Pontiacs with full blower speed.

"The heater should be under the seat—people in the rear seat freeze their feet."—Indiana maintenance supervisor.

Pontiac used to have this excellent feature but trend to lower cars in recent years left no room. Perhaps hot air could be piped back through transmission tunnel.

"The speedometer does not register correctly. It's about 15 m.p.h. ahead of the car's actual speed.

"I'm sick of having the sun visor hitting my hat all the time. I read once about a man in Detroit whose life's dream was to make American cars longer and lower. I'd like to bury him deep."—Vermont art dealer.

I think that dreamer is buried lower than his car by now. Over-all heights are holding at about 54 inches. Stylists are now struggling to make 'em look lower but not be lower—a neat trick.

Here's the final group of best-liked features, eleven through sixteen, in the order Pontiac owners mentioned them.

"The power steering is the best I've used."—Utah professor.

"Interior decor is well above average."—Arizona mortgage broker.

"It's easy to park."—Wyoming housewife.

"Very easy to park."—South Carolina secretary.

"I like its ability to move in snow."—Minnesota painting contractor.

"After putting 11,235 miles on the car, over all types of road conditions, it is still tight."—California salesman.

His comment really counts. Most cars manage to stay squeakfree 'till after 1000-mile checkup; when they're solid at 11,000, you've got something.

"I have never driven a smoother auto."—Iowa auto body repairman.

Let's close the debit side with the final group of gripes, numbers eleven through sixteen listed in their order of mention.

"Windshield runs up too high, which does not suit me."—Illinois bank examiner.

"Too much front and rear exposure to the sun inside, but extra visibility compensates for this."—Iowa welder.

He's got a sensible attitude—it's pretty hard to have shade and vision from the same window at the same time. But, there is room for a better sun visor—perhaps a different type.

"Shorted generator armature was replaced at no charge."—Pennsylvania electrical engineer.

"Engine noises aren't adequately insulated from the passengers."—Vermont plant superintendent.

"I had some trouble with the choke."—Kentucky retiree.

"The small (Catalina, Grand Prix) transmission is slow in starting which makes the engine over-rev until a certain speed."—Pennsylvania carpenter.

This is quite true. This new medium-sized HydraMatic is less complicated, less expensive and less effective (see below).

"I dislike the three-speed automatic transmission; I have no passing gear above 55 m.p.h. I would prefer to have the four-speed automatic that's used in the Star Chief and Bonneville."—West Virginia lawyer.

"Wheels are set too close to fenders for chains."—North Carolina mason. ★ ★ ★

That's the price of "wide track" wheels in a standard body width—you can't have everything.



TAIL DRAGGING?



SCRAPING ON DRIVEWAYS?
This common annoyance, the result of soft springing, heavy weight and the longer, lower design of today's cars, is eliminated when you install Monroe Super Load-Leveler® stabilizing units. Gone is the problem of scraping rear bumper or tailpipe on any incline.

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End this danger with Super Load-Leveler stabilizing units. They prevent jarring jolts that can cause car damage and injury. For a safer, more comfortable ride, have a set installed today where you have your car serviced. Ask about Monroe's 60-day free ride.

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For the repairman, the workshop, kitchen, boat, garage . . . anywhere! Needs no clamps, no screws. The Super Vacuum base holds firmly . . . in any position on any smooth, non-porous surface. 2½" jaws with "V" grooves. Made in USA. Weight: 4½ lbs.



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For the "Do It Yourself", the Repairman, the Man Who Needs a Third Hand. Amazing — holds firmly even in an upright position.

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AT BETTER STORES EVERYWHERE, OR WRITE TO:

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Dept. PM

Walden, New York

Machine Sings Simple Songs

When an electronic computer of the future feels it is being overworked, it might just speak up and say, "Take it easy, boss, my transistors are aching something awful."

Three scientists at Massachusetts Institute of Technology have developed a synthetic speech machine that can sing simple songs or say a few sentences. One use for such a synthesizer, they say, will be in communications between man and machines such as computers.

The synthesizer electronically simulates the sound pathways of the human vocal tract and nasal cavities. Control circuits are given detailed instructions on what to do—and could be controlled, for instance, by a computer. These instructions were determined by analyzing natural speech sounds, studying X-ray motion picture films of persons speaking and incorporating the scientists' knowledge of speech acoustics and phonetics. The men who made the machine are Drs. M. H. L. Hecker, A. S. House and K. N. Stevens.

QUOTE:

"The good scientist-to-be should be a non-conformist. He must be willing to get off well-traveled mental highways and strike out for himself. The brief history of atomic science is the story of men and women who had the intellectual courage of their convictions."

LAWRENCE R. HAFSTAD
Vice-President, Research
General Motors Corp.

False Tooth Holds Hearing Aid

Installed in a hollow false tooth, a tiny receiver picks up radio signals from a microphone and transmitter worn on a deaf person's wrist and relays the signal into the body's nervous system and brain—and the wearer hears.

The receiver is imbedded partly in tissues of the gum, partly in a tooth attached to a dental bridge and placed between live teeth that have a metal filling. The metal relays the signal to the vital pulp of the teeth and thence to the brain.

The device functions even with the mouth closed, according to the inventors, a New York dentist and a California doctor.

Dr. Joseph L. Lawrence and Dr. Henry K. Puharich say patients report the reception of a clear sound with almost imperceptible background noise.

They are working with engineers to make the entire oral device fit within space of a single missing tooth.

Like a breath of tomorrow



PONTIAC MONTE CARLO: 97-inch wheelbase, 174.3 inches over-all; 4-cylinder Tempest engine; 194.5-cubic-inch displacement; 8.25 to 1 compression ratio; Supercharger is positive displacement blower; 300 h.p. at 5600 r.p.m.

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Engineers specify AC Filters . . . for experimental cars of the most advanced design, as well as today's maximum performance beauties. Shown here is the Monte Carlo, an experimental Pontiac now being put to the test over the fastest highways and toughest proving grounds.

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Ask your AC Dealer about Full Filtration by AC. He's a filtration specialist, equipped to give your car the finest protection money can buy. Ask for ACtion . . . ask for AC.

APRIL 1962



OIL AIR FUEL FILTERS

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Are you a guy who didn't MARRY THE BOSS'S DAUGHTER?



They tell us it's a good way to get ahead. The tough part is... there aren't enough bosses' daughters to go around. But there's another way to call your shots.

How? Look at the want ads! Business and industry are crying for men with special training. 60,000 Engineers—Industrial Supervisors, Communications and Traffic Specialists are urgently needed. Demand has never been greater—or salaries higher—for trained people.

With the right kind of training you can step into one of these jobs — write your own ticket. Without it you must compete with a few million other guys who are in the same boat. And, if times get tough, it's not going to be a good boat to be in.

So act now! Choose the education for men who want to get ahead fast. Pick your future from success-proven I.C.S. courses. Whichever field you choose it will be *right* because all I.C.S. courses are developed by business and industry leaders who know what *you* need to know to go places.

You get *personalized* guidance. Earn as you learn. Study in your spare time — at your own pace. And when you get the coveted I.C.S. diploma, it's the frosting on the cake. Chances are by that time you've already been snapped up for a bigger job with a bigger price tag.

Don't wait another day! Choose your course and send for the free career booklets offered below.

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- ☐ Heating
- ☐ Painting Contractor
- ☐ Plumbing
- ☐ Reading Arch. Blueprints

ART

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- ☐ Auto Engine Tuneup
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- ☐ Managing a Small Business
- ☐ Professional Secretary
- ☐ Public Accounting
- ☐ Purchasing Agent
- ☐ Real Estate Salesmanship
- ☐ Salesmanship
- ☐ Salesmanship and Management
- ☐ Traffic Management

CHEMICAL

- ☐ Analytical Chemistry
- ☐ Chemical Engineering
- ☐ Chem. Lab. Technician
- ☐ General Chemistry

- ☐ Oil Field Technology
- ☐ Pulp and Paper Making

CIVIL ENGINEERING

- ☐ Civil Engineering
- ☐ Construction Engineering
- ☐ Highway Engineering
- ☐ Professional Engineer (Civil)
- ☐ Reading Struc. Blueprints
- ☐ Sanitary Engineer
- ☐ Sewage Plant Operator
- ☐ Structural Engineering
- ☐ Surveying and Mapping
- ☐ Water Works Operator

DRAFTING

- ☐ Aircraft Drafting
- ☐ Architectural Drafting
- ☐ Drafting & Machine Design
- ☐ Electrical Drafting
- ☐ Electrical Engineer Drafting
- ☐ Industrial Piping Drafting
- ☐ Mechanical Drafting
- ☐ Sheet Metal Drafting

ELECTRICAL

- ☐ Electrical Appliance Servicing
- ☐ Electrical Engineering

- ☐ Electric Motor Repairman
- ☐ Elec. Engr. Technician
- ☐ Elec. Light and Power
- ☐ Practical Electrician
- ☐ Practical Lineman
- ☐ Professional Engineer

HIGH SCHOOL

- ☐ Good English
- ☐ High School Diploma
- ☐ High School General
- ☐ H. S. College Prep. (Eng'r'g & Science)
- ☐ High School Math
- ☐ High School Science
- ☐ Short Story Writing

LEADERSHIP

- ☐ Industrial Foremanship
- ☐ Industrial Supervision
- ☐ Personnel-Labor Relations
- ☐ Supervision

MECHANICAL and SHOP

- ☐ Diesel Engines
- ☐ Gas-Elec. Welding
- ☐ Heating and Air Conditioning
- ☐ Industrial Engineering
- ☐ Industrial Instrumentation

- ☐ Industrial Safety
- ☐ Machine Shop Practice
- ☐ Mechanical Engineering
- ☐ Plumbing and Heating
- ☐ Professional Engineer
- ☐ Quality Control
- ☐ Reading Shop Blueprints
- ☐ Refrigeration and Air Conditioning
- ☐ Tool Design
- ☐ Tool Making

RADIO, TELEVISION

- ☐ General Electronics Tech.
- ☐ Industrial Electronics
- ☐ Practical Radio-TV Eng'r'g
- ☐ Radio-TV Servicing
- ☐ TV Technician

RAILROAD General Railroad

- ☐ STEAM and DIESEL POWER
- ☐ Combustion Engineering
- ☐ Power Plant Engineer
- ☐ Stationary Diesel Engr.
- ☐ Stationary Steam Engines

TEXTILE

- ☐ General

Name _____ Age _____ Home Address _____

City _____ Zone _____ State _____ Working Hours _____ A.M. to P.M. _____

Occupation _____

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